TRAINING INDUSTRIAL WORKERS

By

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With an Introduction by

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To My Father and Mother

AND TO OTHER FATHERS AND MOTHERS WHOSE STEADFAST, PRACTICAL FAITH IN EDUCATION MAKES PROGRESS POSSIBLE

INTRODUCTION

"Why not try education?" is the question which must occur over and over again to one who studies the adjustments and readjustments of industry. The child in school must be brought to understand the industrial problems ahead of him, and no less the worker in the shop or factory must be brought to see that only through increasing enlightenment represented by education, will he be able to solve his life problems, increase his productive power, and make progress toward full stature as a citizen.

Putting industrial problems into the schools and putting education into the factory involve a high degree of co-operation among all the persons concerned. They must make contacts, get acquainted, and learn from each other. How can these contacts be found? Why are they necessary? What will happen to schools which do not co-operate with industry, and what will happen to industrial establishments whose workers have not the habit of studying and learning? These questions must impel serious thinking men and women forward to find the right relationships between doing and thinking.

Dr. Kelly's book is written to tell industrial managers and educational directors about the lessons which both school people and manufacturers have learned in shop and factory education, and to show how these lessons can be applied to particular establishments. He brings in review the successful accomplishments in vocational education, with the reasons for their success. He points out the need on the one hand for quick training in skill and on the other for the more fundamental education which shall give knowledge of the correct principles back of successful business and for the development of responsibility. Whether the reader wishes to find out the

theory back of successful plans or the actual way to begin, he will find his answer.

In numerous passages Dr. Kelly raises questions which only the future can decide: What will be the forms of co-operation worked out between schools and industry? What will be the legal aspects of education undertaken by the factory? What arrangements will be made to provide for the expense?

The question of public subsidies to encourage vocational education in factories is a difficult one, particularly when we realize that the incidence of assessments for such expense is not nearly so important a problem to consider as to determine who gets the final benefit and who ultimately pays the bill. Must we not agree that the test of whether or not a factory can afford to furnish educational opportunity is whether the expense can be covered by increased production or must be charged against the public in the price of the product? The public must inevitably pay the bill for education in the factory as well as in the school, and if the public refuses to pay because the cost is high and the returns are meager no establishment can long continue its educational activities.

Whether or not every factory should undertake to offer educational opportunity and how broad this work should be, can hardly be answered without further experimentation. It is safe to say at present, no doubt, what Dr. Kelly's book implies, that establishments using boys and girls under the age of majority owe the state the duty of seeing that intellectual progress rather than early deterioration comes from the young worker's contact with industry. The continuation school in this country and the educational reforms now being instituted in England all point to the setting up of simple minimums required by law, and to be furnished impartially by all employers of labor—legislation, that is, against ignorance and inefficiency, exactly as we now have legislation against unsanitary conditions and accidents. Employers raise no objec-

tion to inevitable improvements accompanying the advance of civilization, provided that the imposition of such improvements is well considered, gradual, and impartial. The demands of society have already led to the establishment of wage rates, industrial compensation, good conditions of work, as well as regulations regarding safety, heating and lighting, fire protection, cleanliness, and a host of minor matters.

Dr. Kelly's figures in the first chapter bring to our attention the fact that most industrial establishments are small. The obvious solution of the educational problem presented by this situation will be a single educational director for a number of small factories, a possibility as yet but slightly developed. In one small town an automobile mechanic was made into a vocational teacher by the public school authorities and held classes in his garage in the late afternoon and evening. It may be found possible to have an intimate co-operation which will enable a director to serve factories and schools at the same time, as a co-ordinator or instructor for a number of smaller industrial organizations. The appearance of such a teacher at a shop or factory which contains perhaps only ten or twenty men, even if for only two hours each week, would have a decidedly stimulating effect upon the establishment.

Industry and the public must jointly assume the full social responsibility which education involves. The company which educates its workers must face the possibility of progressive changes in the industrial system and must be willing to see these fundamental amendments made if wisdom so decrees. On the other hand, the company which refuses to educate must face industrial upheaval and the solution of difficulties on no basis other than ignorance. The sincere student of education can propose no doctrinaire solution. His formula is, "Educate the management and the workers and help them jointly to solve such problems as the future reveals." In this connection it is interesting to remark that the two establishments in

which, so far as the author's knowledge goes, the workers know most about the affairs of the management, have no tendencies whatever toward the thing loosely called "industrial democracy." The workers in one of these companies know all about the income on the capital invested, the salaries of the executives, the costs of production, the purposes and plans of scientific management and the details of its operation, and the aims and proposals of those at the top. Knowing these things, they are willing to let the managers manage. Whether this same condition of affairs will obtain as we go forward with education, no one can prophesy. In any case, full knowledge is the most important form of "participation."

The most interesting thing about this book is that it shows that there is no possibility of avoiding the education of industrial workers. In America there can be no escape from education and progress.

So far as the author is aware, this is the first comprehensive book on the subject of education in industry, and in that sense the book is unique and Dr. Kelly a pioneer in a neglected field. We have had good chapters on this subject, as witness Chapter VII in Dr. Kelly's book, "Hiring the Worker," and we have had books on the subject of industrial education from the standpoint of the school. The present book will serve as a guide to educational directors and personnel managers of industrial plants, to persons interested in vocational guidance and anxious to tie up their work with industries as well as schools, to students of educational sociology who recognize the part which industry has played and is about to play in the economic, social, civic, and spiritual progress of the country, and to all thoughtful participants in industry whether owners, managers, public officials, consumers, labor leaders, or workers.

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PREFACE

Of the more than eight million persons engaged in industrial pursuits in the United States, not one-third have had a grammar school education. Those who have had any effective vocational training represent a much smaller proportion of the total. Although it is difficult to estimate the exact amount of the economic and social losses resulting from the lack of education or faulty education, it is quite certain that the aggregate is extremely large. The purpose of this volume is to indicate what some of these losses are, to point out the more important difficulties to be overcome in preventing them, and to suggest a practical program for future action.

It is essential that private manufacturing establishments should avail themselves of every possible opportunity to secure the assistance of public and private educational institutions. It is essential, on the other hand, that educators should continually modify their theories and methods in the light of the needs of progressive industrial concerns. To further a recognition and understanding of these mutual interests, the volume presents a survey of all the important types of schools and classes and illustrations of their work. An effort has also been made to point out the expedient scope of the functions of industrial education to be discharged by federal, state, and local governments, and to show what would constitute a reasonable division of responsibility between the public agency and the private enterprise.

As the work is addressed primarily to business executives who may not be closely familiar with the organization or management of educational affairs, and for whom the training of employees is a matter of immediate practical concern, the

treatment of educational agencies not directly under the control of industry has been subordinated, and emphasis has been laid upon the training which can be accomplished within the plant.

Much illustrative matter has been included which is widely scattered through professional educational literature and not easily accessible to most business executives. On the other hand, owing to the limitations of the discussion, several significant educational developments, such as continuation schools, co-operative part-time classes, and trade schools, have had to be passed over with less extended notice than their importance merits.

The subject matter and conclusions are based upon personal visits to business concerns and schools in many different parts of the United States, numerous conferences with employment managers and school officers, extensive correspondence, and personal experience as principal of a technical high school and director of part-time courses in employment management. Among the many persons who have given assistance in various ways, special acknowledgment is due to members of the Division of Education and of the Bureau of Vocational Guidance of Harvard University, who have helped in collecting material and in revising the manuscript.

Parts of several chapters were first published in *Industrial Management* and in the *Harvard Graduates' Magazine*. Through the courtesy of the editors, this material has been revised for presentation in the present form. The author is also indebted to the Federal Board for Vocational Education for permission to reprint portions of the bulletin entitled "Industrial Education and Employment Management."

ROY WILLMARTH KELLY.

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CHAPTER I

INDUSTRIAL TRAINING AND PRESENT-DAY INDUSTRY

An Educational Creed for Industry

In the industrial world of today every worker needs training. This need grows not alone out of the necessities of the employee but out of the interests of the employer and of the public as well. The inefficient, poorly trained worker not only fails to achieve the highest personal satisfaction by the effective use of his natural ability, but he also interferes with the productiveness of others and retards economic and social progress. In the world's reorganized social structure, no group will have more power than industrial workers. Because they are concentrated in cities and can be easily organized under the factory system, they will use their power to better advantage than those engaged in agriculture, transportation, or business. Whether industry contributes effectively to the common welfare or is wasteful of human life and energy, whether it becomes a tremendous constructive agency or a menace to civilization, depends in large part upon educational forces.

This book is concerned with one proposition—the necessity of training industrial workers in order to conserve the best interests of employees, employers, and the public. On the one hand will appear a recital of certain facts and circumstances intended to portray this necessity. On the other will be found a consideration of the ways and means of carrying out a practical program based upon the recognition of such necessity.

Industrial Training

The term "industrial training" is generally understood to mean a form of instruction designed to prepare for useful or profitable employment. It is thought of as providing instruction for the development of specialized skill, applied technical knowledge, and practical information in a particular occupation. Thus a trade school offers vocational training for blacksmiths, carpenters, or electricians.

Vocational Education

Trade training in its more narrowly specialized form has sharp limitations. To develop really efficient employees is impossible if they are left without any intelligent grasp of the duties of citizenship, or of such matters as personal hygiene, plant sanitation and safety, the use of leisure time, or the simple elements of economics applied to the home and to the management of industry. To meet the situation adequately an education which includes well-rounded preparation for life's activities is necessary. For this broader training the term "vocational education" is usually used.

Vocational education, we may say, is such a system of instruction and training as prepares the way not only for the pursuit of a particular occupation or calling but also for participation in social enterprises directly or indirectly affecting the vocation.

Determining Responsibility

Industrial establishments, as is natural, are mainly concerned with the immediate problems of increasing the skill of operatives and developing persons capable of filling executive and technical positions. For this reason, many industrial leaders are inclined to discount the value of general education carried beyond the acquisition of the tools of learning in the

grammar school. Government, however, is becoming increasingly insistent that those matters which make for health, right living, and intelligent citizenship be not neglected by employers of labor.

Here, accordingly, we find the crux of the whole question of industrial training. With whom does the obligation to educate the worker rest? To make more apparent this basic problem the field of educational effort may be separated into three general phases:

1. A group of subjects in which the state is vitally interested, such as citizenship, thrift, safety, and health.
2. A group of subjects of general value in a considerable number of occupations, such as mechanical drawing, applied science and mathematics, mechanics, economics, business English, or the elements of factory management.
3. The skill or practical knowledge which can be used in only one concern or in a narrowly limited trade.

How far is the private corporation justified in expending money to make up the deficiencies of public education for the first two groups, and to what extent is the expenditure of public funds justified in giving training which is of value to a relatively small number of persons?

From the employer's standpoint it may prove uneconomical to train workers who may stay only a short period of time, who may often, indeed, be enticed away by parasitical firms that fail to do their own part in such training. National, state, or local governments, on the other hand, must determine, before any form of education can be approved and given financial aid, to what extent public benefit and how far private interest is served by it. In a certain measure, legislation regarding vocational education must be subject to the same

criterion which serves as a standard for other forms of labor legislation—that of "reasonable classification." John R. Commons in his "Principles of Labor Legislation" (page 31) states the principle in these words:

> That which is class legislation at one time may become reasonable classification at a later time, if the court perceives that what it once thought was equality is really inequality, and what it once thought was merely private benefit is also public benefit. . . . In proportion as certain classes of laborers, such as women or mine-workers, are recognized by the courts as suffering an injury, and in proportion as the injured persons are deemed to be of importance to the public as well as unable to protect themselves, then legislation requiring the employer to remove the injury and prohibiting the laborer from even voluntarily consenting to the injury ceases to be overruled as "class legislation" and begins to be sustained as "reasonable classification."

Once this fundamental question of responsibility has been decided, the next problem to be faced relates to the extent to which training can be undertaken profitably and to the practical methods of control, financial support, administration, and instruction.

Method of the Present Discussion

To answer these questions in a practical manner, an account will be given of the nature and variety of industrial occupations in the United States, and the need of training persons for them. This will be followed by a description and evaluation of the provisions which have been made to meet this demand, and in conclusion some suggestions will be offered as to what appear to be appropriate lines for future development in the light of successful experience. For the purposes of this study, the field of industrial training is limited to the 344 manufacturing industries listed in the Statistical Abstract for 1917.

Complexity of Industry

The complexity of the problem of industrial education may be evidenced in several ways. Of the 344 industries in the United States mentioned above, 244 employed an average of 2,000 or more wage-earners in 1914. Each of the remaining 100 industries gave employment to persons varying in number from 100 to 2,000. Even granting that many of the wage-earners in these industries are unskilled and that many others can acquire the necessary skill in a few hours, a concession which the experience of most employers shows to be unwarranted, there still remains an exceedingly large number of occupations, each quite markedly different from the others, for which some training is desirable. Steel shipbuilding, for example, requires workmen in about forty important trades. The work done in some fifteen of these trades closely resembles that performed by men in similar lines outside of the shipyard. Twelve or fifteen other shipyard trades have corresponding outside occupations, but to do good work in the yard, the outside mechanic requires some additional instruction in shipbuilding methods. In the case of shipbuilding, that is to say, there are ten or more skilled trades, in addition to a considerable number of semiskilled occupations, for which specific training must be planned.

The descriptions of occupations prepared by the Harvard Bureau of Vocational Guidance reveal a similar situation in other industries. In the manufacture of rubber goods, 185 important occupations are peculiar to this industry and each requires some training. In the manufacture of optical goods, 30 distinct operations besides scores of single-purpose machines are involved. In coppersmithing about 25, in printing and lithographing 70, and in the boot and shoe industry 160 different operations are necessary. The Westinghouse Electric and Manufacturing Company of East Pittsburgh, Pennsylvania, issues a standardized list of occupations used by its

employment department of which more than 170 are peculiar to the work of this company. The Dennison Manufacturing Company of Framingham, Massachusetts, manufacturers of tags, paper boxes, and printed specialties, claims 150 different occupations, many of them peculiar to that concern. An interesting treatment of this phase of modern industry is contained in a series of studies on opportunities for handicapped men, published by the Red Cross Institute for Crippled and Disabled Men, New York.

Size and Geographical Distribution of Industrial Establishments

Among the factors which serve to complicate the problems of industrial training, none are of greater significance than the size and geographical distribution of manufacturing establishments. There has been during the last half century a strong tendency toward elimination of smaller shops and com-

Year	Number of Establishments	Proprietors and Firm Members	Salaried Employees	Wage-Earners (Average Number)	Total	Average Number of Persons per Establishment
1904.......	216,180	225,673	519,556	5,468,383	6,213,612	28.7
1909.......	268,491	273,265	790,267	6,615,046	7,678,578	28.8
1914.......	275,791	264,872	964,217	7,036,337	8,265,426	29.9

Figure 1. Table Indicating Size of Industrial Establishments

Adapted from the Statistical Abstract of the United States, Bureau of Foreign and Domestic Commerce, 1917, page 209.

bination to form larger enterprises. This movement began in the eighties, reached its maximum about 1900, and has again been evidenced in several industries since 1908. In spite of business monopolies and the rapid growth of large factories, the number of shops employing from 5 to 100 persons is still very large. Figure 1 indicates something of this situation, although the number of small enterprises is even larger than

these figures suggest since the average given for persons per establishment represents a balancing of many small concerns against a few extremely large corporations.

Our manufacturing concerns are widely distributed, as is

State	Number of Establishments	Salaried Employees	Average Number of Wage-Earners
Alabama	3,242	7,026	78,717
Arizona	322	849	6,898
Arkansas	2,604	3,544	41,979
California	10,057	26,637	139,481
Colorado	2,126	4,721	27,278
Connecticut	4,104	25,112	226,264
Delaware	808	2,643	22,155
District of Columbia	514	2,011	8,877
Florida	2,518	4,914	55,608
Georgia	4,639	9,661	104,461
Idaho	698	946	8,919
Illinois	18,388	95,130	506,943
Indiana	8,022	28,538	197,503
Iowa	5,614	14,097	63,113
Kansas	3,136	7,526	41,259
Kentucky	4,184	9,131	64,586
Louisiana	2,211	8,499	77,665
Maine	3,378	5,265	82,149
Maryland	4,797	14,801	111,585
Massachusetts	12,013	59,234	606,698
Michigan	8,724	41,796	271,090
Minnesota	5,974	17,623	92,834
Mississippi	2,209	3,189	46,702
Missouri	8,386	28,386	152,182
Montana	939	1,827	13,704
Nebraska	2,492	6,079	25,144
Nevada	180	279	3,655
New Hampshire	1,736	4,374	78,993
New Jersey	9,742	49,056	373,605
New Mexico	368	493	3,776
New York	48,203	182,605	1,057,857
North Carolina	5,507	8,541	136,844
North Dakota	699	749	3,275
Ohio	15,658	82,748	510,435
Oklahoma	2,518	2,793	17,443
Oregon	2,320	4,431	28,829
Pennsylvania	27,521	108,050	924,478
Rhode Island	2,190	8,801	113,425
South Carolina	1,885	3,964	71,914
South Dakota	898	796	3,788
Tennessee	4,775	8,999	74,373
Texas	5,084	11,474	74,853
Utah	1,109	2,233	13,894
Vermont	1,772	2,726	32,704
Virginia	5,508	9,164	102,820
Washington	3,829	8,088	67,205
West Virginia	2,749	5,716	71,078
Wisconsin	9,104	20,538	194,310
Wyoming	337	414	2,989

Figure 2. Table Showing Distribution of Manufacturing Enterprises (1914)

Statistical Abstract of the United States, Bureau of Foreign and Domestic Commerce, 1917, page 205.

Industry	Number of Establishments	Average Number of Employees	Maximum Number Employed	Minimum Number Employed	Per Cent Minimum Is of Maximum
Agricultural implements	601	48,459	61,900	35,208	56.9
Artificial stone products	3,548	10,255	13,201	6,186	46.9
Awnings, tents, and sails	888	5,073	7,072	3,953	55.9
Boot and shoe findings, exclusive of those produced in boot and shoe factories	......	6,714	7,617	6,252	82.1
Boots and shoes	......	191,555	203,135	183,212	90.2
Bread and other bakery products	25,963	124,052	126,772	118,545	93.5
Brick and tile, terra-cotta, and fire-clay products	......	100,182	123,877	76,458	61.7
Canning and preserving, fruits and vegetables	......	50,325	150,735	10,345	6.9
Carriage and wagon materials	......	11,087	12,445	9,534	76.06
Cars and general shop construction and repairs by electric railroad companies	649	26,384	26,970	25,135	93.2
Cars, steam railroad, not including operations of railroad companies	103	54,288	63,678	45,153	70.9
Cash registers and calculating machines	52	8,956	10,220	7,020	68.7
Clothing, women's	5,564	168,907	188,526	145,362	77.1
Cordials and flavoring syrups	142	929	1,458	781	53.6
Cotton goods	......	379,366	389,980	369,138	94.7
Electrical machinery, apparatus, and supplies	1,030	118,078	128,766	107,277	83.3
Foundry and machine-shop products	17,027	362,471	384,214	328,974	85.6
Furniture	......	127,881	136,341	119,861	87.9
Glass	348	74,502	86,461	49,861	57.7
Hosiery and knit goods	1,622	150,520	157,636	142,779	90.6
Ice, manufactured	2,543	23,011	32,526	15,144	46.6

Iron and steel, steelworks, and rolling-mills	427	248,716	271,531	210,279	77.4
Iron and steel, cast-iron pipe	......	12,557	13,427	11,190	83.3
Jewelry	1,914	28,289	30,377	26,542	87.4
Leather, tanned, curried, and finished	741	55,936	58,743	53,491	91.1
Lumber and timber products	34,484	479,786	507,876	421,735	83.0
Millinery and lace goods	2,079	45,274	53,209	38,273	71.9
Paper and wood pulp	718	88,457	89,916	86,725	96.6
Petroleum, refining	176	25,366	25,849	24,868	96.2
Pickles, preserves, and sauces	......	12,590	19,136	10,026	52.4
Printing and publishing, newspapers and periodicals	......	114,375	115,834	112,504	97.1
Rubber goods, not elsewhere specified	301	50,220	58,246	44,574	76.5
Saddlery and harness	......	12,969	13,854	11,876	85.7
Shipbuilding, iron and steel	......	33,508	36,788	28,107	76.4
Shipbuilding, wooden, including boat building	......	10,981	12,794	9,224	72.1
Shirts	......	51,972	56,659	47,754	84.3
Silk goods, including throwster	902	108,170	112,761	100,045	88.7
Stamped and enameled ware, not elsewhere specified	......	28,731	30,785	26,302	85.4
Structural ironwork, not made in steelworks or rolling-mills	......	47,167	50,214	42,523	84.7
Tobacco, chewing and smoking and snuff	......	25,980	27,995	24,288	86.8
Tobacco, cigars, and cigarettes	......	152,892	156,404	149,915	95.9
Typewriters and supplies	107	11,091	13,273	7,686	57.9
Wire	54	17,600	18,816	16,255	86.4
Wood, turned and carved	828	11,615	12,655	10,851	86.6
Woolen and worsted goods	......	158,692	165,175	149,053	90.2

Figure 3. Table Showing Seasonal Nature of Certain Industries in the United States (1914)
Statistical Abstract of the United States, Bureau of Foreign and Domestic Commerce, 1917, pages 186 and 260.

indicated by Figure 2. Particularly in the West where hydroelectric power is available, rapid increases in the number of establishments and wage-earners can be anticipated in the next decade. California, now the twelfth state according to the number of employees engaged in manufacturing, increased the value of its manufactures from $67,000,000 in 1870, to $750,000,000 in 1917. In 1914 the state used for industrial purposes about 500,000 primary horse-power developed from hydroelectric plants. Four years later the amount was more than 50 per cent greater. As is already the case in New England, many of the new projects throughout the West are sure to be developed in the smaller towns and cities, thus further extending the present wide-spread geographic distribution.

One-Industry Towns

Smaller towns and cities with diversified industries are exceptional. Communities have built up in many cases around a single manufacturing plant or the holdings of one corporation. Newport News, Virginia, sends the majority of its wage-earners into one local shipyard; Crockett, California, is the community center for the California-Hawaiian Sugar Refining Company; Ludlow, Massachusetts, was built and is largely owned by a cordage company, the Ludlow Manufacturing Associates. Other small communities are devoted to only one or two industries, but a number of competing or only loosely combined firms are represented. Thus North Attleboro, Massachusetts, has more than twenty manufacturing jewelers, while Akron, Ohio, is the center for five or six large concerns and nearly a score of smaller factories manufacturing rubber goods. As a rule, the range of industries in cities under 100,000 population does not include more than two or three important lines with a scattering of small shops engaged in other activities.

Financial Resources

The financial resources available for training employees vary greatly in the different industries. The amount that can be devoted to such purposes is affected by the nature of the industry, market fluctuations, the size of the firm, and the locality in which it is situated. A prosperous, progressive establishment employing 10,000 persons is much more likely to appropriate generously for educational activities than the conservative, financially embarrassed plant employing only 100 persons. A company with a monopoly of the local labor market is much less apt to spend money on personnel activities than a firm forced into competition with several high-grade shops.

In the same way, some sections of the country are better able to support industrial training at public expense than are others. The per capita wealth in North Carolina is $726.35, whereas Nevada, with comparatively few industries and a strong public sentiment in favor of developing them, has a per capita wealth of $4,135.35. The South Atlantic states from Delaware to Florida have a per capita wealth less than half that of the Rocky Mountain and Pacific Coast states, with a corresponding difference in willingness and ability to support vocational education. There are also striking differences in the ability to support education apparent in the several cities within the boundaries of each state. In Massachusetts, for example, Wellesley, Milton, and Brookline have property valuations per pupil in the public schools ranging from $20,000 to $31,800, while ten cities in the same population group have valuations less than $4,000 per pupil.

Seasonal Fluctuations

If the majority of workers remained with one firm for several years at a time, or if they even worked steadily at the same trade throughout the year, the problem could be

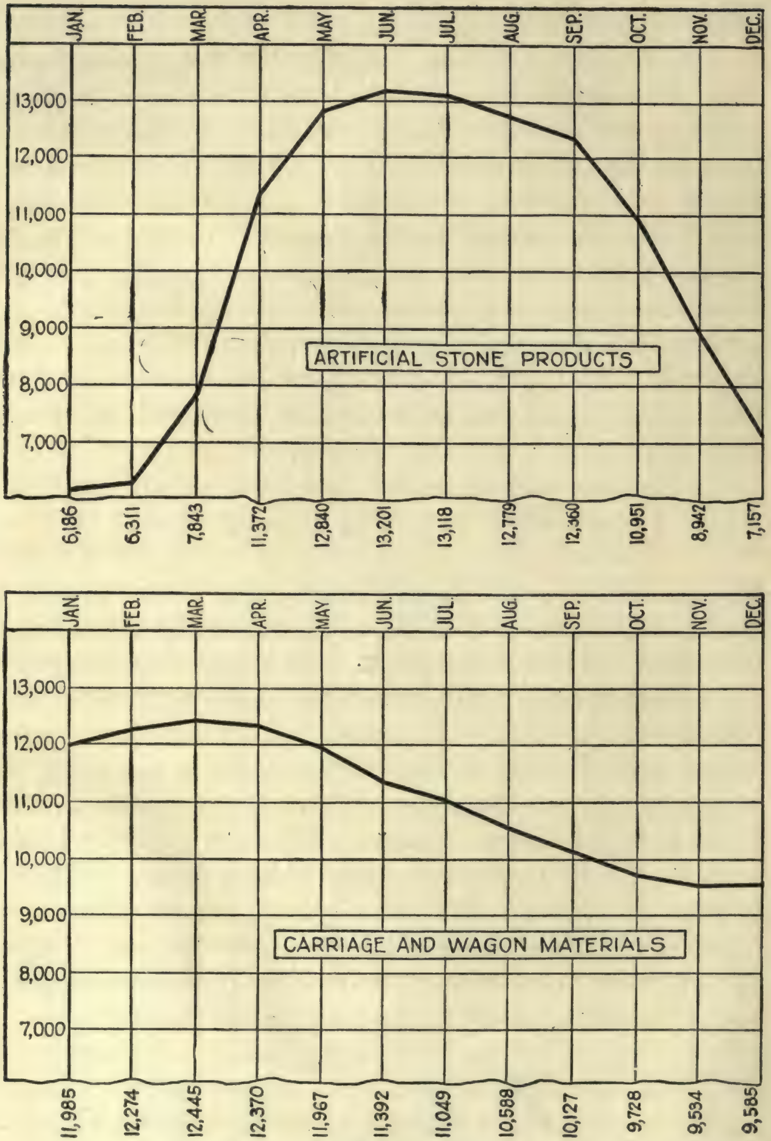
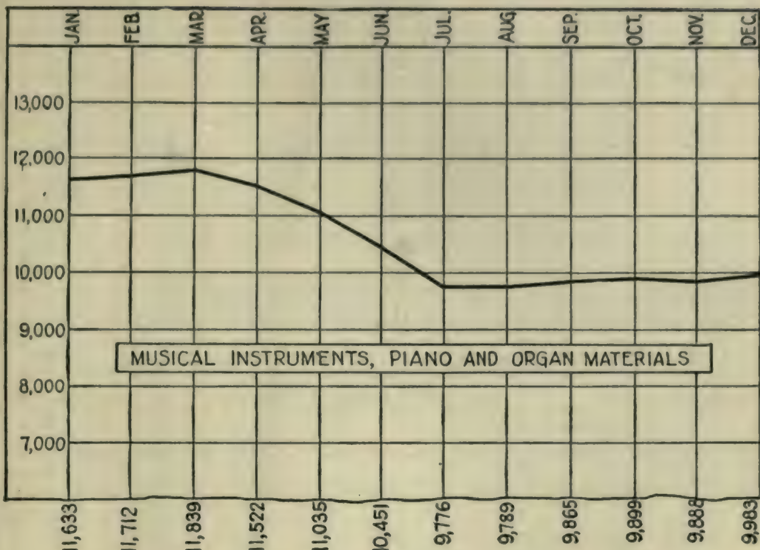
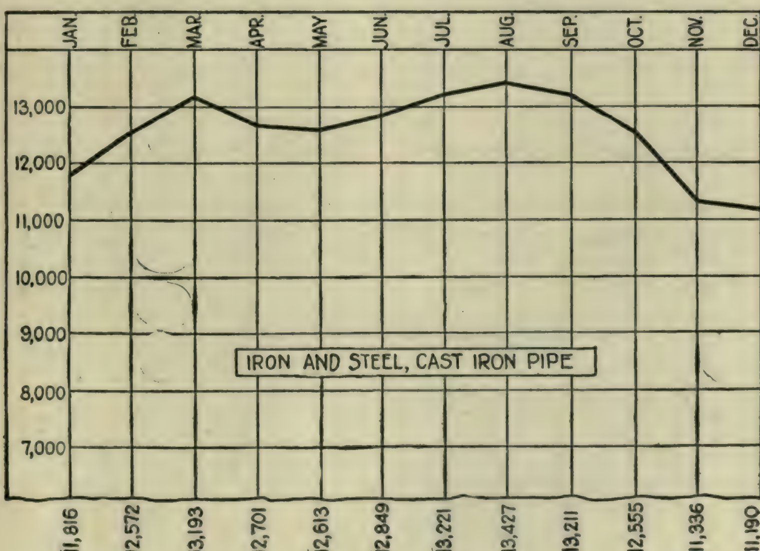


Figure 4. Diagram of Seasonal Labor Fluctuations in

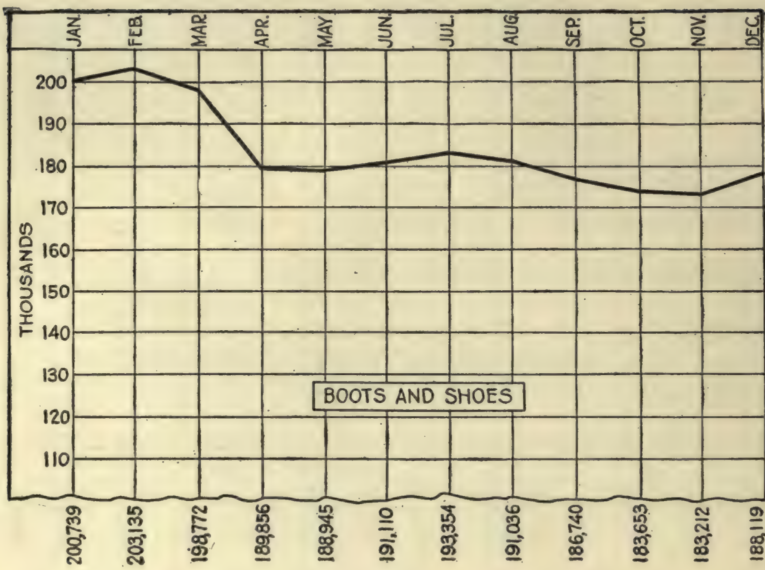
Data from the Statistical Abstract of the United States, Bureau of Foreign and





Selected Industries Employing about 10,000 Persons

Domestic Commerce, 1917. Vertical distance indicates number of persons employed.



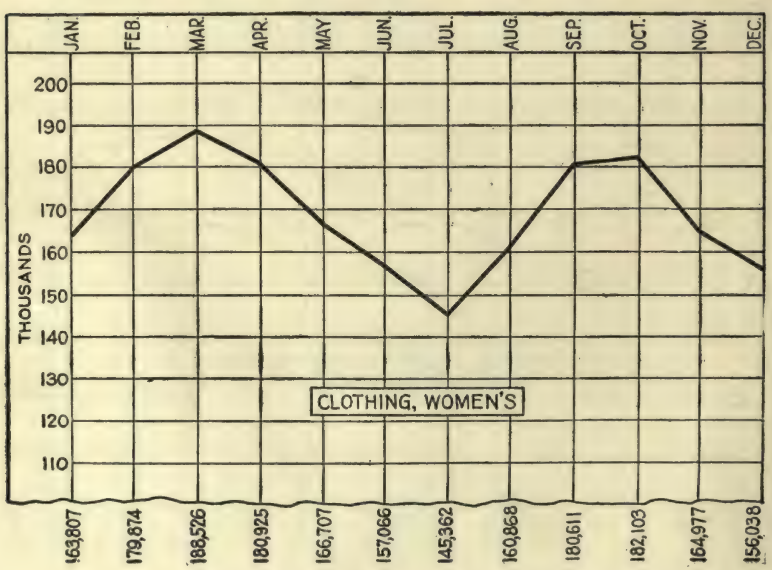
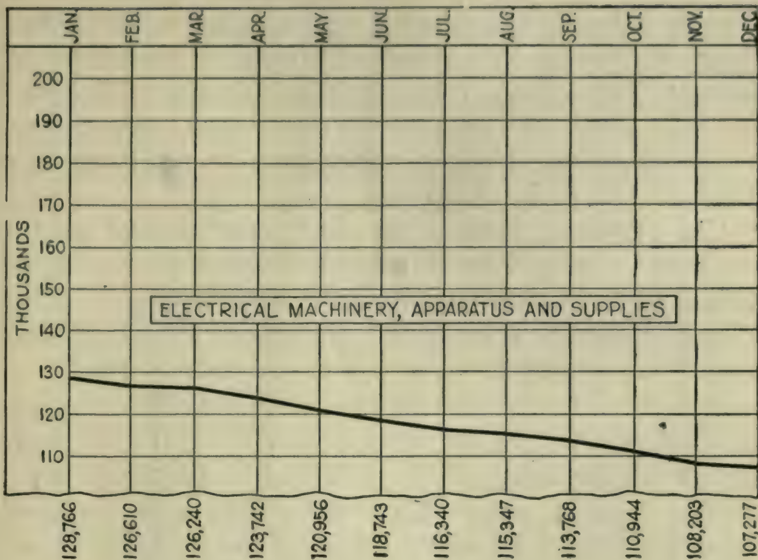
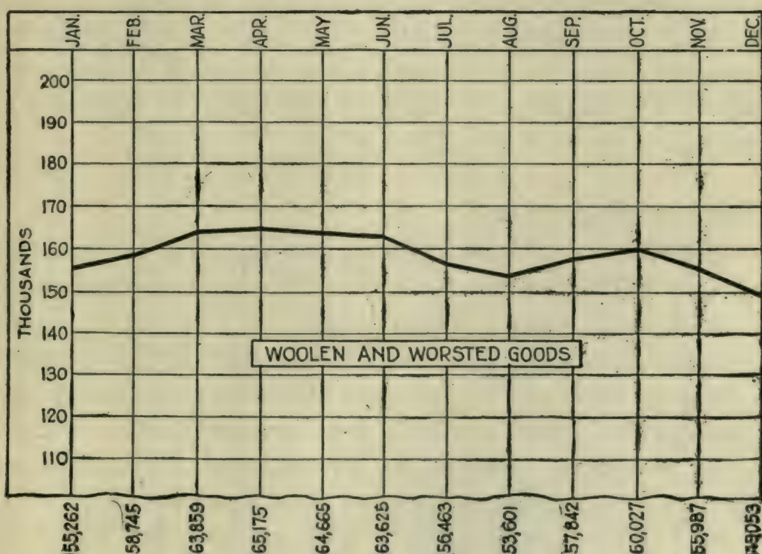


Figure 5. Diagram of Seasonal Labor Fluctuations in

Data from the Statistical Abstract of the United States, Bureau of Foreign and Domestic





Selected Industries Employing over 100,000 Persons

Commerce, 1917. All of these figures are affected by the growth of the industry in question.

simplified somewhat. Figures 3, 4, and 5 give some indication of the number of job changes brought about because of seasonal fluctuations. Very few industries show differences less than 5 per cent between the maximum and minimum number of persons employed during the year, and many have fluctuations of 10 to 25 per cent.

The Statistical Abstract for 1917 gives the total number of persons employed in all manufacturing industries in the United States for each month for the year 1914. Adding the maximum figures regardless of the month in which they occur, gives a total of 7,707,592 wage-earners. The corresponding total for the minimum number at work is 6,292,834. The difference, 1,414,758, represents the number of wage-earners who are either idle for some time or seek employment in other lines of work. There are also numerous seasonal shifts due to departmental fluctuations which do not appear in the figures cited because the workers are merely transferred to some other part of the plant. It is therefore reasonable to estimate, that from this cause alone, not less than 1,500,000 persons are employed in at least two kinds of work every year.

Steadying Employment

Relatively little has yet been accomplished in reducing seasonal manufacturing and other similar causes for variations in the working force. Joseph Willits has prepared an excellent statement of the stabilizing efforts which he found ought to be undertaken in Philadelphia. This statement, "Steadying Employment," may be found in the *Supplement* to the Annals of the American Academy of Political and Social Science, May, 1916. Sumner Slichter, in "The Turnover of Factory Labor," has summarized the methods successfully utilized by concerns throughout the United States. Only the more important measures are outlined here, together with some sug-

gestions as to their bearing upon general industrial training.

1. The major part of the force may be held during periods of unusual business depression by reducing the hours and working part-time.

2. Seasonal fluctuations due to variations in sales or disposal of the product may be obviated by:

(a) Discovering new markets or stimulating sales for off seasons.
(b) Inducing customers to place orders earlier.
(c) Developing extra lines of manufacture to fill in the dull periods.
(d) Standardizing goods or encouraging retail selling under the maker's label so that goods may be manufactured for storage.
(e) Making repairs or alterations, or performing operations on special parts during the dull season.
(f) Transfer of employees from slack to busy departments.
(g) Dovetailing the work of two or more different plants, so that employees are transferred according to seasonal requirements.
(h) Maintaining emergency squadrons which assist in doing a variety of different kinds of work, thus making it unnecessary to take on new employees for short periods of time.

3. The number of temporary jobs may be reduced by:

(a) Planning and scheduling work to give an even flow throughout the year.
(b) Avoiding short-time congestion in a small number of departments by the use of emergency squadrons or by improvements in scheduling.
(c) Distributing maintenance and repair work throughout the year.

Transfers

It will be observed that many of these proposals make it necessary for employees to be transferred from one kind of work to another. This frequently involves a second course of training; it may be necessary to send groups of employees into special vestibule classes for a brief period, or to place them under the care of a corps of emergency instructors. Changes ought to be scheduled ahead whenever possible so that employees may be apprised of future changes and gradually made ready for them in odd hours.

Transfers almost always require adjustments in wages. Some unusual incentive or extensive reorganization of the plan of payment must often be resorted to before workers can be induced temporarily to undertake a different line of activity, even though the new task, at slightly lowered wages, presents the only alternative to unemployment. Transfers and training to eliminate unemployment or turnover are thus seen to be closely related to the questions of individual adaptability and the adjustment of wage rates. Only by careful study of the several factors in each case and by consulting the mental attitudes of all parties to the agreement can a successful plan be evolved.

Labor Turnover

In addition to persons thrown out of their accustomed employment because of seasonal fluctuations is the much greater number affected by what is known as labor turnover. Only fragmentary evidence is yet available as to the exact amount of labor turnover throughout the United States. A study made by the Bureau of Labor Statistics during the summer of 1918 in Detroit and Cleveland showed that 27 out of 79 plants examined had turnover percentages greater than 300 per cent annually. After eliminating the separations from service due to military duty, there still remained 37 plants

where the turnover ranged from 200 to over 500 per cent. Sumner Slichter has classified the turnover in 105 establishments, including commercial and industrial concerns. His method of computing the turnover is not quite accurate, but the errors are probably not large. (See Figure 6.) Similar figures gathered from plants throughout the United States

Size of Turnover	Number of Establishments with Turnover of Respective Sizes	Average of Maximum and Minimum Forces	Number of Terminations of Employment
200 per cent or over	11	12,788	30,014
100 per cent to 200 per cent	30	69,797	105,857
80 per cent to 100 per cent	9	24,913	22,416
60 per cent to 80 per cent	21	60,021	41,814
40 per cent to 60 per cent	18	38,756	19,523
20 per cent to 40 per cent	11	19,029	6,219
Below 20 per cent	5	734	99

Figure 6. Table Showing Size of Labor Turnover in 105 Establishments
Taken from "The Turnover of Factory Labor" (page 22), by Sumner H. Slichter.

show that turnover percentages of less than 50 per cent are exceptional, that a few entire plants and occasional departments have turnover figures ranging from 350 to 1,000 per cent or more, and that the median for manufacturing industries in normal times is between 80 and 125 per cent.

Short-Term Employees

One salient feature of these changes in personnel is that the majority of them take place among a comparatively small group of employees having a short term of service. This fact has significance with reference to the question of training new employees. Figure 7 shows that 76 per cent of the separations from service in 14 California concerns took place among employees who had held their positions less than three

months. Of the employees remaining on the pay-roll at the end of the year in the same concerns, only 38 per cent had been in service less than three months.

The study made of plants in Ohio, referred to above, showed that in Cleveland the groups with continuous service records of less than one month, although representing only

Period of Service	Employees on Pay-Roll at End of Year		Separations from Service During the Year	
	Number	Per Cent	Number	Per Cent
One week and under	692	6	3,946	22
Over 1 week to 2 weeks	476	4	2,481	14
Over 2 weeks to 1 month	950	8	3,177	17
Over 1 month to 3 months	2,324	20	4,165	23
Over 3 months to 6 months	1,145	10	2,096	11
Over 6 months to 1 year	1,774	15	1,280	7
Over 1 year to 2 years	1,481	13	525	3
Over 2 years to 3 years	627	5	211	1
Over 3 years to 5 years	633	5	140	1
Over 5 years	1,459	13	265	1
Total	11,561	100	18,286	100

Figure 7. Table Showing Number of Separations and Length of Service of Employees in 14 California Concerns

Monthly Labor Review, February, 1919. Only 5 per cent of this turnover was due to military causes.

11 per cent of the total number employed at any given time, were responsible for more than 43 per cent of the "separations"—that is to say, cases of quitting service. In Detroit, the service groups under one month constituted only 12.6 per cent of all employees but gave rise to 51 per cent of the turnover.

It was this fact more than anything else which enabled the Ford Motor Company to maintain a turnover record of 32 per cent or less throughout the year 1918 when only three

other plants in the vicinity were able to get theirs below 100 per cent. By paying high wages and pursuing other satisfactory employment policies, the labor turnover had been reduced from 370 per cent in 1913 to 16 per cent in 1916. Separations

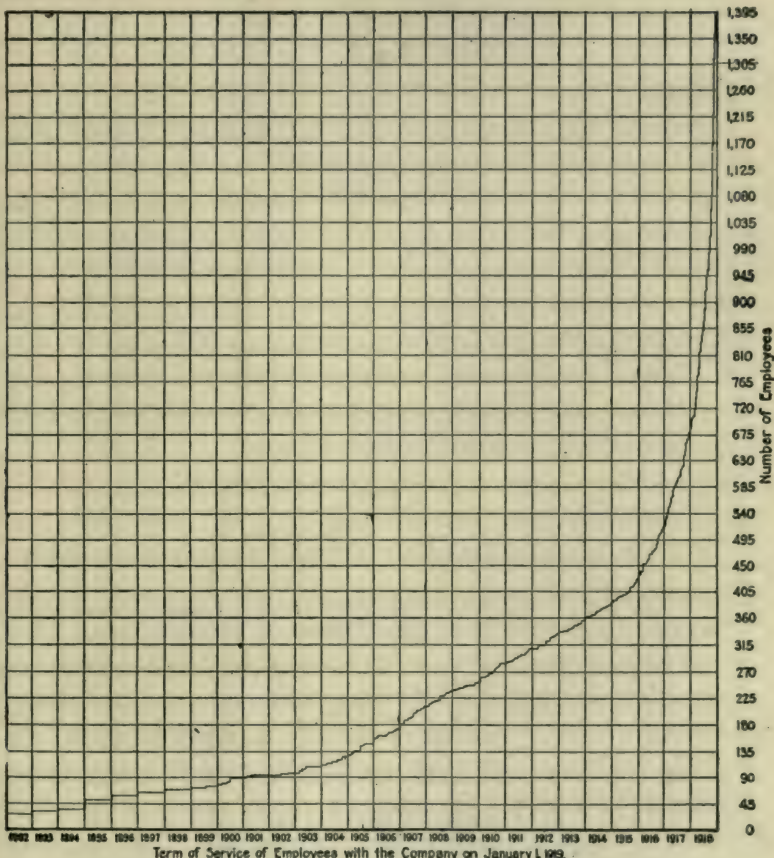


Figure 8. Diagram of Length of Service of Employees in a New England Factory

From a census taken in January, 1919. The vertical distance indicates the number of employees, and the horizontal distance the term of service. The upper portion of the curve shows that nearly half of the persons employed had been with the company less than one year.

from service became almost negligible and a large body of employees with records of continuous service for a year or more was built up. Despite the fact that other companies in Detroit were engaged in war work and were paying higher wages in 1918 than the Ford Motor Company, these persons remained at their posts.

Unskilled and Child Labor

Next to the concentration of "separations" among short-term employees, the most significant facts with reference to turnover are that the amount increases rapidly as skill decreases, and that it is greatest among children from 13 to 17 years of age. The results of investigations by Slichter in various occupations lead him to the conclusion that "among skilled tradesmen the turnover rarely runs above 50 per cent, and indeed in most cases is below 30 per cent. Among common laborers, on the other hand, the turnover is rarely below 100 per cent and is usually much higher."

A Typical Factory

Several essential principles with reference to turnover and length of service may be summarized by reference to Figures 8 to 11.[1] As shown by a census taken in January, 1919, about 50 per cent of the labor force in the company under consideration had been employed for less than one year, and nearly one-third of the organization for less than six months. The majority of the short-term employees were in three departments, all of which were subject to large seasonal variations. Although complete records were not available, it also appeared that these departments were responsible for a large part of the labor turnover.

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[1] These figures are from an unpublished study made by the Harvard Bureau of Vocational Guidance assisted by Professor Edward D. Jones of the Federal Board for Vocational Education.

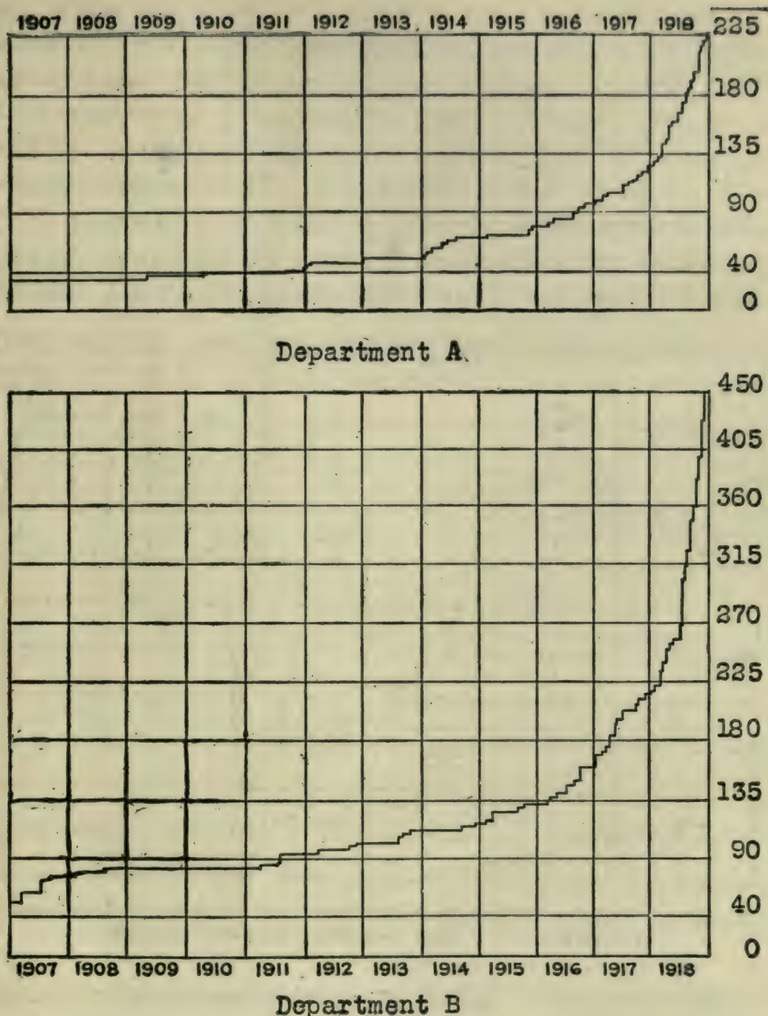

Figure 9. Diagram of Length of Service of Employees in Two Departments of the Concern Represented in Figure 8

The curve for nearly every department in this company shows a similar configuration, proving that there is only a small group of well-trained employees with a large body of shifting employees.

The curves of Figures 10 and 11 show the number of employees in two typical departments, plotted week by week for a period of three years. Department "X" manufactures a seasonal product and has but few skilled employees. Department "Y" is not subject to seasonal disturbances and has a larger proportion of skilled help. The variations in the number employed at points *a, b,* and *c* in Department "X," as well as practically all of the sharp fluctuations in Department "Y," are due to preventable "separations" and needless

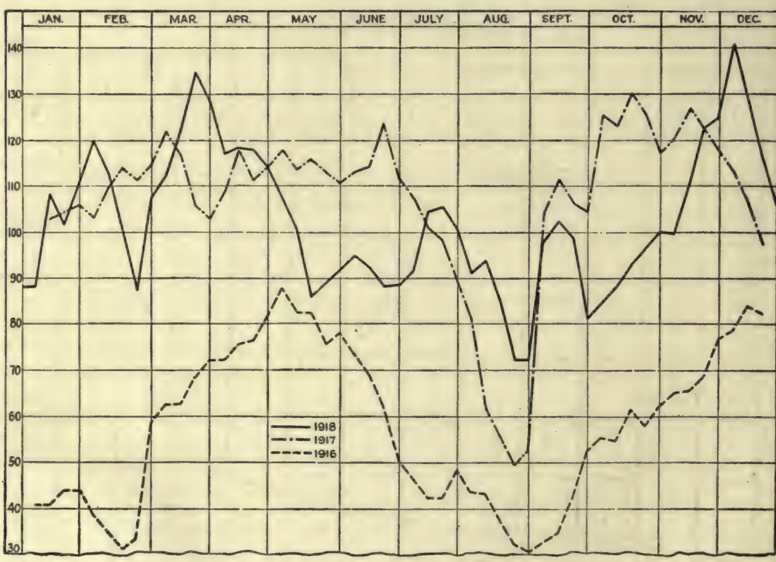

Figure 10. Diagram of Weekly Fluctuations in the Number of Employees in Department "Y" Manufacturing a Staple Commodity

hiring and firing. Little or no effort has been made to transfer workers from seasonal departments to other work within the plant during slack periods, nor has any systematic plan been developed for dovetailing the work in this factory with that in other plants engaged in seasonal work. It has been said, for instance, that many of the women and girls employed in

the manufacture of jar rings go into the confectionery industry during the slack months, but nothing has been done by the companies concerned to facilitate such transfers for their employees.

Unemployment

Unemployment is another phase of occupational maladjustment which forced itself upon the attention of the public long before any study had been made of labor turnover. The

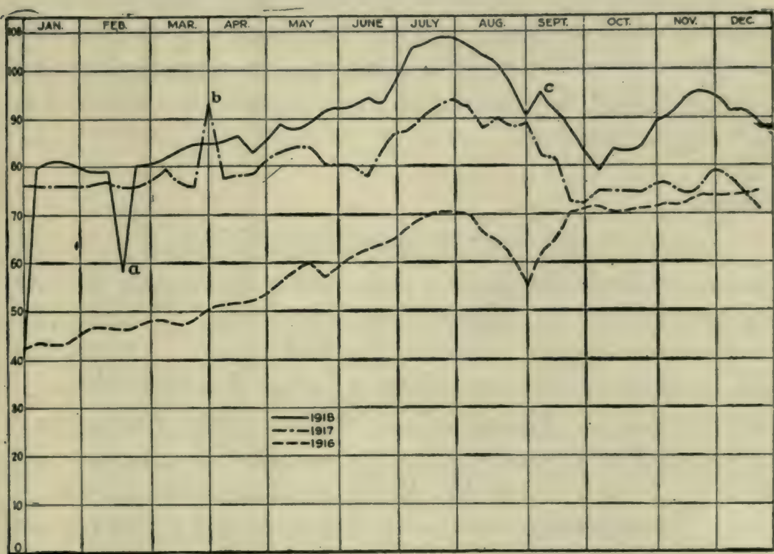

Figure 11. Diagram of Weekly Fluctuations in the Number of Employees in Department "X" Manufacturing a Seasonal Product

total number of unemployed in the United States was estimated in 1911 at 4,500,000. Studies made by reliable investigators in 16 large cities in the United States for March and April, 1915, and summarized in Bulletin 195, Bureau of Labor Statistics, United States Department of Labor, July, 1916, brought to light the following facts:

Number of families investigated	401,548
Number of persons represented by the study	1,694,895
Number of wage-earners represented by the study	647,394
Total unemployed	74,218
Per cent of wage-earners unemployed	11.5%
Total wage-earners employed only part-time	107,494
Per cent of wage-earners on part-time	16.6%
Per cent on part-time and unemployed	28.1%

The highest percentage of unemployment reported was in Duluth, where 20.3 per cent of the wage-earners were out of work, and the lowest in Bridgeport, Connecticut, where 4.3 per cent were unemployed and 19.9 per cent were engaged in part-time occupations.

Causes

During the war period, unemployment ceased to be an urgent problem, but there is little reason to suppose that we will not be faced by it again in the near future. The majority of the investigations made in this field appear to show that unemployment is most wide-spread among unskilled and semi-skilled workers. The untrained, the physically handicapped, and those low in intelligence always make up a larger proportion of the unemployed than their relative numbers warrant. Unemployment frequently results in the partly trained worker losing the slight advantage gained, so that he is easily discouraged and slips back into the unskilled labor group.

Remedies

The suggestions for decreasing unemployment most widely accepted as worthy of support are:

1. Establishment of public employment offices.
2. Regulation of manufacturing and other work to reduce seasonal changes.

3. Planning construction of public works at seasons of unemployment.
4. Introduction in all large concerns of employment departments to handle labor questions.
5. Systematic training of employees.
6. Special training for those who are mentally or physically handicapped.
7. Retraining for injured workers who cannot return to their former occupations.

Of all these suggestions, none are more fraught with possibilities than those concerned with training.

CHAPTER II

INADEQUATE INDUSTRIAL TRAINING AND ITS RESULTS

Preparation of Young Workers

Although a well-balanced program of training must always make allowance for retraining, for promotions and transfers, and for the progressive growth in efficiency of older workers, the chief concern of all vocational education must always be the preparation of young workers for entrance upon their occupational careers.

A consideration of the number of young persons entering industrial life each year, their physical and mental status, the nature of the training they receive in educational institutions, and their early vocational experiences suggest quite as many knotty problems as those arising from the character and distribution of the industries.

Defects of Public School Systems

Critical examinations of public school systems, conducted during the last decade in all parts of the United States, indicate three major defects in elementary and secondary education which have a bearing upon vocational success.

1. About one-third of all the pupils in the public schools are retarded from one to five years in comparison with the normal standards.

2. Less than half of the children entering the first grade complete the work of the eighth grade, and only one child in ten graduates from high school. About one-third of the school population is eliminated before the work of the sixth

grade is completed or at the end of the compulsory education period as defined by state laws.

3. The majority of those who enter employment between the ages of 14 and 18 drift aimlessly from job to job. Legislative restrictions prevent them from entering many of the trades, so they begin work in clerical or unskilled positions, make little or no progress in the acquisition of skill or knowledge, and acquire unfortunate habits and vicious mental attitudes.

A child is usually regarded as over age or retarded who is older than the normal age for his school grade. It is common to assume a two-year span for the standard for each grade, assuming as normal ages 6 to 7 for the first grade, 7 to 8 for the second, and 13 to 14 for the eighth. The results of an investigation of retardation published by George D. Strayer in 1911 are summarized in Figure 12.

	133 Cities of 25,000 Population or Over		186 Cities of Less than 25,000 Population	
	Boys	Girls	Boys	Girls
Of normal age	56	60	54	58
1 year over age	20	18	20	18
2 years over age	10	9	11	8
3 years over age	5	3	4	3
4 years over age	2	1	2	1
Total over age	38	32	38	31
Total under age	4	4	4	5

Figure 12. Median Percentages of the Whole Number of Boys and Girls Who Were of Normal Age, Over Age, or Under Age (1908)

Quoted from Inglis, "Principles of Secondary Education," page 124.

Maryland Survey

A survey of the public schools of Maryland shows even larger percentages of retardation than Strayer's study reveals and also brings to light the tendency of over-age pupils to drop out before completing the elementary school course. (Figure 13.) In the Maryland report it is estimated that if all the over-age pupils remained to complete the work of the

Grade	Per Cent Under Age	Per Cent Normal Age	Per Cent Over Age
1	0.1	39.3	60.6
2	0.4	13.9	85.7
3	1.5	15.8	82.7
4	1.8	14.5	83.7
5	1.7	13.5	84.8
6	3.5	11.8	84.7
7	3.6	15.7	80.7
8	5.6	18.3	76.1
I	6.1	20.8	73.1
II	7.7	20.2	72.1
III	7.8	21.9	70.3
IV	17.0	39.0	44.0
Total	2.2	20.8	77.0

Figure 13. Table Showing Children Under Age, Over Age, and Normal Age in Maryland Public Schools

Based on 17,650 children in city schools in the winter of 1915. From "Public Education in Maryland" (page 88), by Flexner and Bachman.

elementary school there would be an enrolment in the Maryland schools of about 4,000 children 16 years of age or older. "There are, as a matter of fact," says the report, "only 165. It is thus evident that probably 98 per cent of the children now behind their grade will drop out before completing the course; in all probability they will lose just about as many grades, as they are now in arrears." Reports from other states show similar percentages of retardation.

Retarded Pupils

Some retarded pupils are always able to make rapid progress and recover the lost ground, but these are relatively few in number and constitute a less grave problem than those who are both over age and make slow progress. In regard to the latter class, a survey made in 1915 reported that "in Cleveland, 22 per cent of the children belong to this class. There are more than 1,500 of them." Recent studies of employed boys and girls serve to corroborate this opinion.

A typical example is furnished by a study, made in 1918 by representatives of the United States Bureau of Education in co-operation with local school authorities, of 287 boys and 117 girls between the ages of 14 and 16 employed in Wilmington, Delaware. The following table shows the number who had been greatly retarded in their studies, a direct cause in many cases of their leaving school.[1]

Number of Years Retarded	Boys	Girls
Two years or more....................	45.2%	73.5%
Three years or more..................	22.2	36.6

In the same city, 18 per cent of the children still in school aged 13, and 28 per cent of those aged 14 were two or more years behind their normal school grades.

Prevalence of Child Labor

One of the gravest problems for industrial education is created by the large number of pupils who leave school between the ages of 14 and 16 years. The Cleveland Survey found that one child in six left before the age of 14; at the age of 15 nearly half were gone; at the age of 16 two-thirds had dropped out; at the age of 17 only one in five remained.

[1] Adapted from "Industrial Education in Wilmington, Delaware." United States Bureau of Education Bulletin, 1918, No. 25, page 46.

The Chicago Bureau of Vocational Guidance reported in 1916 on an investigation of 6,270 employed minors from 12 to 19 years of age, a group intended to be representative of conditions in the city. It was found that 2,276 of these children were between 13 and 16 years of age and had left school in the third, fourth, fifth, and sixth grades. Of 12,583 children who received their working permits in Chicago during the year ending June 30, 1915, 8,570, or 68 per cent, had not reached the fifteenth birthday, and 2,720, or 21 per cent, were just 14 years of age, the compulsory age limit.

Age	1910 Census Report			Estimated for 1918	
	Gainfully Employed	Not in School	Total Number	Gainfully Employed	Not in School
Boys					
14 to 20 years	4,389,732	3,838,088	6,362,628	4,640,000	4,390,000
14 and 15 years	774,109	460,739	1,798,449	820,000	510,000
16 to 20 years	3,615,623	3,377,349	4,564,179	3,820,000	3,880,000
Girls					
14 to 20 years	2,197,740	3,833,581	6,403,719	2,490,000	4,350,000
14 and 15 years	350,140	432,143	1,770,898	390,000	480,000
16 to 20 years	1,847,600	3,401,438	4,632,821	2,100,000	3,870,000
Both Sexes					
14 to 20 years	6,587,472	7,671,669	12,766,347	7,130,000	8,740,000
14 and 15 years	1,124,249	892,882	3,569,347	1,210,000	990,000
16 to 20 years	5,463,223	6,778,787	9,197,000	5,920,000	7,750,000

Figure 14. Table Showing Number of Children Gainfully Employed and Not in School

The Vocational Summary, September, 1918. Published by the Federal Board for Vocational Education.

The extent to which children under 20 years of age are employed in the United States and the number in the industries is indicated in Figures 14 and 15.

Only a few states have enacted satisfactory legislation regarding child labor or made adequate provision for the supervision of employed minors. The United States Revenue Act of 1918 enacted after the Federal Child Labor Law had been declared unconstitutional by the Supreme Court, should have

Industry	10 to 13 Years		14 to 15 Years		16 to 20 Years	
	Male	Female	Male	Female	Male	Female
Building and hand trades	4,403	605	19,144	8,513	237,663	89,013
Brick, tile, and terra-cotta factories	597	9	2,264	142	16,120	778
Glass factories	410	39	4,349	618	16,607	2,988
Clothing factories (suits, cloaks, and overalls)	322	267	3,487	5,858	30,183	38,734
Clothing factories (except above)	30	143	770	4,954	7,696	40,950
Shirt, collar and cuff factories	46	249	677	3,308	4,178	18,342
Bakeries	252	52	2,306	1,080	17,649	6,121
Candy factories	52	108	769	2,582	4,636	10,347
Automobile factories	20	1	1,058	59	18,336	1,407
Blast furnaces and steel rolling-mills	270	10	3,479	227	48,892	2,223
Iron foundries	123	4	1,657	76	18,975	977
Shoe factories	177	93	5,379	3,777	29,113	24,004
Furniture factories	428	58	3,326	346	19,548	2,418
Saw- and planing-mills	2,827	29	7,980	144	67,194	1,067
Other wood-working factories	700	73	2,965	689	15,330	3,612
Jewelry factories	19	12	880	549	5,478	3,582
Tinware and enamelware factories	99	39	1,554	495	11,313	2,980
Box factories, paper	22	55	429	1,836	1,995	7,017
Printing and publishing	556	66	9,025	2,457	54,044	27,998
Cotton-mills	6,371	5,440	14,449	14,816	42,256	50,796
Knitting-mills	631	922	2,532	7,279	8,796	29,358
Silkmills	149	284	2,713	6,153	8,717	23,573
Woolen and worsted mills	140	130	3,455	4,396	13,589	20,231
Cigar and tobacco factories	962	881	3,205	5,518	15,943	29,699
Electrical supply factories	24	14	1,353	696	13,535	8,683
Rubber factories	17	15	966	818	7,529	5,113

Figure 15. Table Showing the Number of Minors Employed in Selected Industries

Census Report for 1910, Vol. IV, pages 312–410.

an excellent effect upon progress in this field if it can be enforced for a reasonable trial period.[2] Better vocational guidance and training for these children cannot be expected until the hours of labor have been shortened and the compulsory school age extended.

[2] United States Revenue Law of 1918. Title XII.

Section 1200. That . . . . any mine, quarry, mill, cannery, workshop, factory, or manufacturing establishment situated in the United States in which children under the age of fourteen years have been employed or permitted to work, or children between the ages of fourteen and sixteen have been employed or permitted to work more than eight hours in any day or more than six days in any week, or after the hour of seven o'clock post meridian, or before the hour of six o'clock ante meridian, during any portion of the taxable year, shall pay for each taxable year, in addition to all other taxes imposed by law, an excise tax equivalent to 10 per centum of the entire net profits received or accrued for such year, from the sale or disposition of the product of such mine, quarry, mill, cannery, workshop, factory, or manufacturing establishment.

Section 1207. That as used in this title the term "taxable year" shall have the same meaning as provided for the purposes of income tax in section 200. The first taxable year for the purposes of this title shall be the period between sixty days after the passage of this Act and December 31, 1919, both inclusive, or such portion of such period as is included within the fiscal year (as defined in section 200) of the taxpayer.

Bill approved by the President, February 24, 1919; took effect April 25, 1919.

Waste of Child Labor

The losses to employers as well as to children from early employment are largely due to beginning work in low-grade tasks, lack of training for promotion, and excessive labor turnover. State restrictions, the skill, strength, and technical requirements inherent in many kinds of work, and the apparent attractiveness of "office" jobs, account for the pronounced tendency to begin as messengers, salespersons, office boys, or in clerical positions. Those who do go into the shops imme-

Number of Jobs	Time Employed							
	Less than 3 Months	3 to 6 Months	6 to 9 Months	9 to 12 Months	12 to 15 Months	15 to 18 Months	18 to 21 Months	21 to 24 Months
1	183	120	92	46	59	19	18	4
2	82	95	72	47	47	37	17	5
3	35	55	58	43	47	34	25	18
4	13	23	28	22	28	17	23	21
5	2	11	15	16	21	10	9	10
6	..	5	7	7	4	7	8	9
7	..	1	2	..	3	2	5	3
8	..	1	..	..	2	4	..	2
9	..	1	..	..	..	..	4	..
10	..	..	..	..	..	..	..	..
11	..	..	..	..	..	1	1	..
12	..	..	..	..	..	..	..	1
Total No. of boys	315	312	274	181	211	131	110	73

Figure 16. Table Showing Industrial Histories of Chicago Boys from the Elementary Grades

Report of the Bureau of Vocational Guidance of the Chicago Public Schools for 1916, page 33.

diately after leaving school are discouraged by the lack of suitable incentives and by the nature of the work open for them to do; constant changing from job to job is the natural consequence.

Chicago's experience in this regard, as shown in Figure 16, is typical of reports from cities throughout the country. The table presents the records for 1,607 boys who came from the elementary grades and whose industrial histories were

complete for the periods shown in the table. Girls from the elementary grades changed positions almost as frequently as the boys. Over 26 per cent of a group of 3,679 children whose employment stories were compiled left their first position before completing one month. Only 6 per cent stayed a year and only 3 per cent remained with the first employer two years or more. Of those under 16 who had been out of school from one to two years, over 50 per cent worked less than half the time.

A similar study of working children in Waltham, Massachusetts, showed that 58 per cent of those employed for less than two years had held three or more different positions.[8] The school survey of Wilmington, Delaware, referred to above, tabulates the number of different jobs held by 587 working boys and girls aged 14 and 15. Of these children, 77 had shifted positions from 3 to 10 times, and 151 had each worked for two different employers.

The amount of shifting in most cities appears to be less among older children and among high school graduates, but the general statement holds good that full-time employment as it is carried on in the industries at the present time is a seriously wasteful process for both children and employers.

Illiteracy

According to the census of 1910, there were in the United States, 5,516,163 persons who could not write in any language. According to the same census, there were 2,953,011 foreign-born whites 10 years of age and over who were unable to speak English. In the years just preceding the war, owing to the great increase in immigration, the number of non-English-speaking people in the country showed a decided growth.

[8] Abels, M. H., "From School to Work." Children's Bureau, United States Department of Labor, 1917, page 53.

Of the 13,377,087 immigrants entering the country between 1900 and 1914, 11,726,606 were 14 years of age or over and consequently beyond the school age. A large number of these people had enjoyed some educational opportunities before coming to the United States. But those opportunities were limited and of course left them without training either in our language or in American ideals.

Americanization Work

Although the education of our non-English-speaking population is primarily a public duty, there is much that industry can do to co-operate with public agencies. Industry suffers at the same time that the community does. Inability to understand English frequently results in accidents to the workman. Because he cannot talk with his English-speaking fellow-employees, he has little or no sympathy with them. This tends to throw the non-English-speaking employees into groups and if there is a troublemaker in a group, as often happens, he can foster misunderstandings. Also the man who speaks no English has only a limited contact with his foreman. This leads to confusion and lack of understanding, in the course of which the non-English-speaking worker becomes dissatisfied with his treatment, or grows to feel that the work is beyond his capacity. When he decides to seek employment elsewhere there is little opportunity for the employment department to discover the real cause of the separation.

Productive Service

With the development of applied science and mathematics and the growth of scientific management, there has come into industry a new point of view with respect to the kind of service which ought to be rendered by skilled workmen and executives. The really valuable employee is no longer merely an artisan. He must be something of an inventor, a planner,

capable of solving practical difficulties by the application of scientific principles, and willing to offer suggestions for the progressive modification of the practices of the shop. The worker who is taught nothing except rule-of-thumb methods becomes a hindrance to progress. He has not been habituated to subject his own habits or the operations of other workmen to critical examination. Irregular progress in learning the several elements of the trade, the lack of any instruction in the principles of industrial organization and management, little or no practical schooling in trade mathematics or applied science, and the unsympathetic attitude of foremen and journeymen toward the learner, go far toward explaining the backwardness of many of our important industries.

Possibility of Progress

When we compare conditions in the textile mills, the shoe factories, and the shipyards, as they were managed before the war, with the surprising progress evidenced in agriculture, in industrial chemistry, in the design of electrical machinery, and in civil engineering, it is easy to realize the importance of thorough technical training and the planned development of intelligent experts. Many of our mills and factories are using exactly the same methods as fifty years ago, and their workmen live in surroundings quite as unsanitary and unwholesome as those which then existed. The implications of the data contained in Figures 17, 18, and 19 are unavoidable.

Government funds have been appropriated only recently for researches in industry and the majority of the studies made are of too general a character to reach the conditions which most need to be corrected. If only half as much money and energy as have been expended by colleges, the government, and private individuals and institutions in fostering agriculture had been devoted to thorough studies of personnel problems in textile-mills, in the clothing industry, factories making

rubber goods, steelmills, shipyards, shoe factories, etc., many of the worst abuses would long since have been corrected.

Much the same thing may be said of some of the skilled trades practiced in small shops, such as blacksmithing, core-making and molding, boiler-making, and certain of the building trades. A few schools have been established for the trades, but they teach only the elements of skill and technical knowledge, and they produce but slight effect upon the customs of the trade as a whole. Trade apprenticeship has been divorced from any systematic training and has brought about practically the same undesirable results as the upgrading of factory helpers or improvers without the guidance of trained instructors.

Municipalities	1910	1912	1914	1916
Textile Cities:				
Lawrence	168	135	140	116
New Bedford	180	156	150	139
Fall River	186	151	161	174
Lowell	231	184	147	150
Taunton	212	171	123	156
Other Cities:				
Boston	124	117	103	104
Worcester	137	133	105	100
Cambridge	100	97	90	89
Springfield	126	102	95	94
Lynn	100	112	95	85
Somerville	102	78	70	67
Brockton	102	100	103	92
Malden	90	84	95	66
Newton	84	76	58	62
The State	133	117	106	100

Figure 17. Table Showing Infant Deaths per 1,000 Live Births in Massachusetts Municipalities. (Compare with Figure 18.)

Seventy-fifth Annual Report of the Secretary of Massachusetts.

City	Deaths per 1,000 Births Among Children Under 1 Year
Amsterdam	66.8
Barcelona	143.4
Belfast	144.2
Berlin	137.3
Birmingham	128.9
Bremen	105.1
Breslau	171.7
Bucharest	203.4
Budapest	149.6
Copenhagen	102.7
Dresden	116.8
Edinburgh	97.7
Florence	126.0
Glasgow	128.3
Hamburg	113.6
Leipzig	142.9
Liverpool	132.6
London	105.4
Lyons	87.3
Moscow	278.7
Paris	99.3
Prague	113.1
Petrograd	228.5
Stockholm	66.5
Vienna	156.0
Zurich	91.0
New York	102.0

Figure 18. Table Showing Deaths from all Causes among Children under 1 Year of Age in European Cities and New York (1913)

Monthly Bulletin of the Department of Health of the City of New York, August, 1914, page 198.

A Training Program

From the brief sketch of industrial conditions thus far presented, several conclusions may be reached regarding the components of a satisfactory program of training. Because of the great diversification and wide geographical distribution of manufactures, and the existence of relatively large numbers of small plants, the training of employees will always be

a local and individual matter. General plans can be prepared for the leading lines of work in the more important industries, but even then the actual instruction must be modified to suit the immediate situation.

Seasonal fluctuations in the demand for labor and labor unrest will force manufacturers for some years to come to

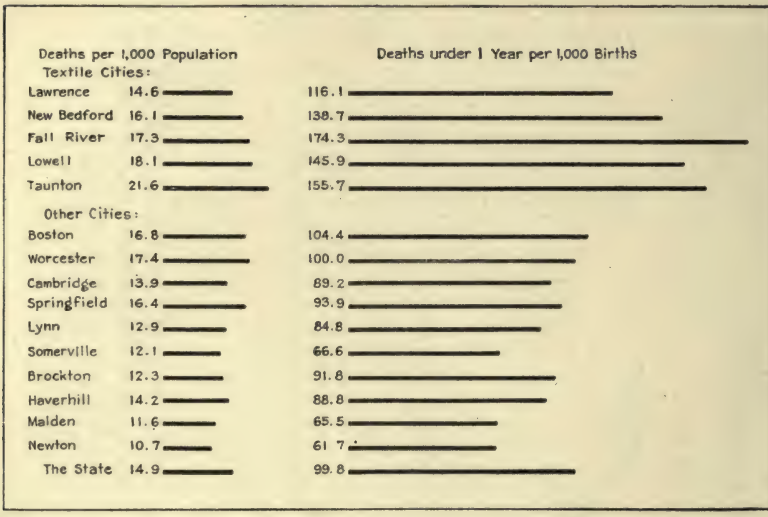

Figure 19. Mortality Statistics of Textile Cities Compared with Other Municipalities in Massachusetts (1918)

Seventy-Fifth Annual Report of the Secretary of Massachusetts on Births, Marriages, and Deaths.

train and retrain adults as well as younger persons. The groups of factory operatives to be trained are likely to change constantly from month to month. Advancement should be entirely according to individual ability, and teaching methods require constant adaptation to the experience and previous education of the learner. The amount of instruction necessary in the individual case may vary from an hour's trip through the factory, a brief explanation of the company's rules and policies, and a few minutes spent in becoming acquainted with

the peculiarities of the workshop, to a five years' apprenticeship, supplemented after graduation by evening or part-time courses in foremanship, employment management, factory control, and advanced technical subjects.

The Duty of Industry

The educational activities of the factory of the future will be planned to eliminate faulty selection and placement of employees, to decrease the number of desirable persons who leave or who are discharged because of faulty training or the lack of training at the start, to shorten the time lost by new employees in reaching maximum production, to prepare better leaders, and to reduce losses arising from waste of materials, slow and inefficient methods, ill health, unnecessary fatigue, and obstructive policies. This implies a broad curriculum, for it means planning education for everyone from the general superintendent down. It implies sufficient flexibility to meet changing demands or emergencies, and enough breadth of vision and soundness of policy to create a stable, intelligent working force.

Obligations of the Public

The peculiar interests of public educational agencies are to prevent the waste from unsatisfactory employment and idleness among children from 14 to 18, to secure better vocational guidance, to reduce the amount of unnecessary and wasteful shifting from job to job, and to find ways and means for co-operating with the industries in giving preparatory vocational training and extension education for citizenship, homemaking, health, thrift, and the use of leisure time. A lengthened period of compulsory education, part-time schooling, Americanization, and a more generous attitude toward the use of public funds for improving specific occupational efficiency are among the immediate national possibilities.

CHAPTER III

EARLIER FORMS OF APPRENTICESHIP

Historical Background

The close of the World War has left us with a confusion of fresh experiences and impulses in education. Those responsible for interpreting and adapting these experiences and directing the new forces are confronted with a task of staggering magnitude. The necessity rests upon them of laying hold of every means by which this responsibility may be the more successfully discharged. Perhaps nothing is more important than to make sure that while their faces are to the front they are not unmindful of what is behind. It is a mistake to assume, because some of the problems of industry are new, that their educational aspects are not beset by extremely powerful and stubborn traditions. The scope of the present volume does not permit more than a brief glance backward. It is possible only to consider briefly the significant outlines of the growth of industrial education. Since the apprentice system is our oldest form of systematic vocational training it is easier to organize certain portions of the account about the story of its development. With apprenticeship, therefore, we shall begin our inquiry into the historical background of the industrial situation as it exists today.

Beginnings of Trade

It is possible to trace the beginning of our modern system of trade apprenticeship to the European guilds of the Middle Ages. The early history of these trade associations is interwoven with the rise of the medieval towns. From the time

of Theodoric to the reign of Frederick Barbarossa there were few towns; the majority of the population of England, Germany, and northern and central France lived on great estates held by feudal lords or by church officials. About the year 1000, town life, which had been the center of Greek and Roman civilization, began to reappear in western Europe. At first the townspeople were little better than serfs, paying heavy dues to the lord or monastery upon whose land the town was situated. With the rapid growth of trade during the later Middle Ages, merchants began to come from the far East, offering rich fabrics, precious stones, perfumes, drugs, porcelains, and spices for sale or barter. This encouraged the artisans in the small communities to produce a surplus of goods above what they themselves needed, and to sell or exchange their wares for the tempting articles brought from a distance. The West soon learned how to make silk, linen, and cotton fabrics as well as woolen cloth. The manufacture of glass was introduced and the development of numerous other arts and crafts began which made possible the beautiful cathedrals and town halls of a later century. As the people gained in independence through trade and manufacture, they began to organize insurrections against the landowning ecclesiastics and the nobility. Charters, which granted the right to regulate industry and commerce, were either won by force of arms or purchased for the towns and the old dues or services were either abolished or changed into taxes.

Formation of Guilds

The tradesmen in these medieval towns were both artisans and merchants, each conducting his own manufactory and offering his goods for sale. Within each town, those who belonged to a particular trade—the weavers, the tailors, the armorers, the bakers—formed a union or guild to protect their local interests. In time the influence of the guilds increased

until they were able to enforce minute regulations as to the way in which the trade was to be practiced, the daily hours of labor, the time to be spent in learning the trade, and the number of apprentices allowed for each master craftsman.

The Guild and the Trade Union

The guilds differed from our modern trade unions in several important ways. For one thing, membership in the guilds, except during the first half of the fourteenth century, was composed entirely of the master workmen who owned the shops, tools, or machines. Apprentices and journeymen were excluded from meetings and had no voice in determining the policy of the organization. For another, much of the power of the guilds was derived from the fact that their regulations could be enforced by government authority. For example, in Paris, if it was learned that a journeyman goldbeater had illegally set up a shop for himself, a representative of the guild went to the offender's house, accompanied by a town officer and the offender's tools and materials were seized. The offender himself might be sent to the galleys for a three-year term at hard labor. He could count himself fortunate if he were let off with a heavy fine and the loss of every chance of ever becoming a master.

Apprenticeship—Its Meaning

While a young man was learning his trade, he lived in the home of a "master workman" as an apprentice. The usual term of apprenticeship was from five to nine years. A few simple trades could be learned in three years, but it took ten years to become a journeyman goldsmith. The apprentice received no financial remuneration and in many cases even paid a high premium for the opportunity, but the indenture or agreement provided for certain other rewards. Jonathan

French Scott in "Historical Essays on Apprenticeship" describes the system as follows:

> These indentures show that the chief duty of the apprentice was to serve his master faithfully, not only in business, but in the performance of household tasks or other services; the master was obliged to teach the lad his trade, to house, feed, and clothe him. More than this, he was supposed to give the youth such moral and religious training as a boy of immature years would naturally require. In a word, it was his duty to prepare the boy to be not merely a good craftsman but a good citizen as well. The closeness of the personal relationship between the two is clearly brought out by the fact that not rarely the apprentice led his master's daughter a bride to the altar.
>
> The apprenticeship system, as it existed in medieval times, offered opportunity to the youth of learning all branches of his trade. The shop was small. Master and apprentice often worked side by side at the same bench. The master himself worked at all processes of his handicraft, and therefore it was comparatively easy for him to teach all processes to the lad at his side. It was comparatively easy, too, for the lad to follow the workings of his master and to imitate them. The number of apprentices being small the master could give each one a large part of his attention. Furthermore, as there were but few apprentices and journeymen, there was but little division of labor, and therefore but little of the modern tendency to keep a boy employed on one or two processes to the exclusion of all others. It was to the interest of the master that the apprentice be able to assist him at every process of the craft. To the master, too, accrued the profits of the apprentice's toil during the latter's term of service, and the more skilful the boy, the greater the gains of his employer.

Harsh as were its terms, apprenticeship, nevertheless, constituted the chief means of advancement to the medieval youth. Only through its training was it possible for the boy to grow up into the skilled man. Fortunate, therefore, were those chosen to serve with and learn from the master craftsmen of

the time. And it is important to note that the way was open to comparatively few. The guilds saw to it that the different trades were not overmanned. Furthermore, many were barred through lack of capacity to develop the requisite skill. As a result the apprenticeship system was of benefit to the few and many were left to get along as best they might.

After the term of apprenticeship was completed it was customary in some guilds to require a man to work for several years as a journeyman, before he could establish a shop of his own. Entrance fees to the guild, the cost of a dinner or a "drinking," and in Continental Europe the production of a *chef-d'œuvre,* were other obstacles to setting up as a master. Although apprenticeship was not required universally, it came gradually to be the only method of securing either the freedom of the craft or a franchise in the municipality. It could be avoided only by those who could afford to purchase their rights or by those who inherited them from their parents; and even these roads were barred to a large extent by legislation during the fifteenth and sixteenth centuries.

Persistence of Apprenticeship

The remarkable persistence of the system is to be explained in large part because of the adaptability of apprenticeship to the demands of the medieval industries. Careful individual attention from the master and the long term of service gave opportunity for the refinement of skill and artistic ability in construction so essential to the handicrafts. The accomplishments of the ironworkers, joiners, carvers, and decorators of the Renaissance all give evidence of an efficient training under stringent supervision by the guilds. Both master and apprentice were under close surveillance; the subjects of instruction were often specified and the apprentice was given a rigid examination at the end of his term. Quoting Scott again:

> Thus the Clothworkers of London insisted that the candidate for mastership "shear and worke" in the common hall of the guild before the master wardens and certain of the assistants. The Shoemakers' Guild of Carlisle required that the apprentice, after completing his term "have foure paire of shoes given him to worke"; if the shoes were well wrought he was to be admitted a journeyman, but if not he must be a "hireman." Rather more complicated examinations were laid down in the ordinances of the Barber-Surgeons and the Apothecaries, examinations which must have done much toward changing the craft of "barbery" into the science of surgery, the art of the apothecaries into the science of medicine.

Decline of Guilds

The guilds began gradually to lose their power during the seventeenth century, and toward the end of the eighteenth century they began to decline rapidly. Constant strife arose because of restrictions which prevented a man from changing his trade or altering the nature of his product. Robinson and Beard in their "Outlines of European History" write as follows of these restrictions:

> In Paris a hatter, who had greatly increased his trade by making hats of wool mixed with silk, had his stock destroyed by the guild authorities on the ground that the rules permitted hats to be made only of wool and said nothing of silk. The trimming-makers had an edict passed forbidding anyone to make buttons that were cast or turned or made of horn. . . .
>
> The goldsmiths were the natural enemies of all who used gold in their respective operations, such as clock-makers and watch-makers, the money-changers, and those who set precious stones. Those who dealt in natural flowers were not allowed to encroach upon those who made artificial ones. One who baked bread must not make pies or cakes. The tailor who mended clothes must not make new garments.

Enterprising workmen and merchants began openly to evade the guild regulations. Thoughtful leaders disapproved the regulations because their traditional and unnecessary restrictions hampered progress. As new towns grew up and the number of skilled workmen multiplied, it became increasingly difficult for the guilds to exercise proper supervision over apprenticeship. England established a system of courts to redress wrongs and punish offenders, but there was no plan of inspection to bring abuses to light and very naturally the court favored the capitalist master rather than the beggar apprentice. The examination of apprentices at the end of their term was largely abandoned and the number of semiskilled workmen was accordingly augmented.

Only the old handicraft trades remained in the guilds. Companies engaged in the newer industries, such as the manufacture of glassware, porcelain, and silk and cotton goods, early became independent and were granted special monopolies and privileges by progressive rulers.

The Industrial Revolution

The end of the guild system came with the introduction of power-driven machinery and factories which definitely marked the beginning of our modern industrial system of capital and labor.

Following the disappearance of the guilds and the invention of labor-saving machinery there begins one of the blackest chapters in the history of civilization. For the old family relationship between master and apprentice there were substituted capitalism, highly specialized occupations, and child labor. Trade instruction became a farce, wages were reduced to the starvation point, and tradesmen were driven into unskilled labor. "The children might retain the name of apprentices, but they were practically wretched, unintelligent little factory hands."

Abuses Under the New System

By 1835, more than one-third of the mill operatives in England were children, half of them under 14 years of age. Their plight is thus described by Robinson and Beard in their work already referred to.

> Thousands of little paupers were taken from the poorhouses and nominally apprenticed, but practically sold, to the proprietors of the mills. Nor were pauper children the only ones to suffer. Necessity or greed on the part of parents, and the demand for "cheap labor" on the part of the manufacturers, brought thousands of other children into industrial life. Parliamentary reports tell of children under five working in the mines, of those but little older crawling on hands and knees through narrow subterranean passages, dragging heavy carts of coal, and of mere lads laboring in pinmills at high tension for twelve hours a day.

Neglected sanitation, bad ventilation, scanty food, and excessive hours finally gave rise to serious epidemics. In England, because the epidemics endangered the lives of the upper classes, Parliament was at last stirred to action. Beginning in 1832, a series of acts were passed which greatly reduced the hours of labor for women and minors and improved the condition of apprentices. It was not until 1906 and 1908, however, that measures were passed which successfully mitigated the evils of sweatshop employment, industrial accidents, unemployment, and child labor.

In Germany and Austria, apprenticeship held its own against the encroachments of new manufacturing methods better than in Great Britain, because of the continuance of many of the hand trades and because of the provision of part-time and continuation schools. France, Switzerland, Denmark, and other countries have made similar provisions for supplementary instruction and have safeguarded apprenticeship by various forms of national legislation. Nevertheless

what has been true of England has been true to a greater or less extent, of every European country.

Apprenticeship in America

Although apprenticeship, together with nearly all its attendant abuses, was transmitted to America from Europe, the guilds never had a foothold on the western continents. Moreover, it is much to the credit of the North American colonies that the majority early passed legislation protecting all apprenticed children, and requiring their masters to make provision for their instruction in reading and writing.

A Massachusetts General Court Order of 1642 obliged all masters and parents to teach their apprentices and children "to read and understand the principles of religion and the capital laws of the country" as well as to train them in profitable employments. The act was enforced by the selectmen who were empowered to take neglected children from their masters or parents and bind them out to law-abiding persons. Reading and writing were made a compulsory part of the apprentice's training by a Poor Law enacted in 1703, and ciphering was added to the list in 1771. Similar legislation in all of the New England Colonies and in New York insured every apprentice free instruction in reading, writing, and arithmetic in either day or evening schools. The laws were sufficiently well enforced to make apprenticeship take on the aspect of "a new and peculiarly American institution" which successfully endured throughout the domestic period of trade and manufacture.[1]

The "Domestic Period"

The transformation from the household to the domestic period of industry in America began to take place in the

[1] Seybolt, Robert Francis, "Apprenticeship and Apprenticeship Education in Colonial New England and New York," pages 104-107.

latter part of the seventeenth century and continued during the early part of the eighteenth century. During this period larger mills and machines were introduced to supplement the work of individuals upon materials destined for home consumption. The gristmills ground the grain of the community for a small price, the fulling-mills thickened the cloth, which had been spun and woven in the several homes and was afterwards to be shaped into garments in the homes. Rolling- and slitting-mills rolled iron into sheets and cut the sheets into rods, which the farmers shaped into nails by hand on the anvil during the winter evenings.

It is recorded that in Virginia in 1649 there were five water-mills, four windmills, and a great number of horse and handmills for grinding grain. Toward the close of the century, such mills rapidly increased throughout the state and fulling-mills for cloth were added. In Cambridge, Massachusetts, there was a printing press in 1639, the first one in the colonies. Georgia, the last colony to begin printing, set up a press in Savannah in 1762. Machines and appliances for extracting iron ore and working iron were introduced into many of the colonies during the last half of the seventeenth century and the beginning of the eighteenth. In the eighteenth century Pennsylvania and Massachusetts had large numbers of furnaces, forges, foundries, rolling-mills, nail works, and wiremills.

Decline of Apprenticeship

During the domestic period much of the work in the mills was performed by helpers, unskilled laborers, indentured servants, and slaves, so that apprenticeship began to decline. From 1619 to 1819 indentured service was common in all the thirteen colonies. It differed from apprenticeship in that the master was in no way obligated to teach the apprentice a trade. Slavery was of course an important factor in caus-

ing a falling off in apprenticeship among the southern colonies. In the skilled occupations in the northern states, on the other hand, apprenticeship prevailed on the whole until the change from the domestic method of manufacture to the factory system was nearly complete.

The Factory System

Factories were first erected about the time of the war of 1812. The textile industry was well developed by the middle of the century, but the extension of the factory system to general manufacture did not take place on a large scale before the Civil War.

For nearly forty years after the abolition of slavery, the outstanding feature of American industry was the merging of independent concerns to form business monopolies or combinations. In 1870, the Standard Oil Company was only one of 250 oil refineries and controlled only 4 per cent of the nation's output. Twelve years later it had absorbed a large number of small holdings and 40 of the leading concerns, and 95 per cent of the oil produced in the United States was sold by the Standard's gigantic trust. Following the lead of the Standard Oil Company, some three hundred industries, representing a capitalization of $7,246,000,000, formed non-competitive combinations or organized as large-scale corporations during this period, the movement reaching its climax in the years from 1898 to 1902.

Figure 20 suggests what took place in three typical industries, although the figures are somewhat misleading because the averages for the years after 1880 have been greatly reduced by including large numbers of very small shops which persisted in spite of the dominant tendency. Save for the building and handicraft trades, the day of the small-scale entrepreneur and the highly skilled workman who learned his trade through a long-term apprenticeship was nearly at an end.

Some conception of the effect upon American life produced by the changes occurring during the last century may be gained from the statement that nearly 90 per cent of the working population was engaged in agriculture in 1800, while only 33 per cent was employed in similar pursuits in 1910. A large proportion of those now in manufacturing and mechanical occupations, 10,658,881 in 1910, are at work in

Year	Cotton Manufactures		Manufacture of Agricultural Implements		Slaughtering and Meat Packing	
	No. of Establishments	Average Number of Wage-Earners per Establishment	No. of Establishments	Average Number of Wage-Earners per Establishment	No. of Establishments	Average Number of Wage-Earners per Establishment
1840	1,240	58	......	......	......	......
1850	1,094	84	1,333	5	185	18
1860	1,091	112	2,116	8	259	20
1870	956	142	2,076	12	768	11
1880	756	231	1,943	20	872	31
1890	905	242	910	43	1,118	39
1900	973	306	715	65	921	74

Figure 20. Table Showing Growth of Large-Scale Industrial Enterprises in the United States

Adapted from "Industrial History of the United States," page 356. by Katharine Coman.

trades, or are using machines and methods which were unknown fifty years ago.

Effect of Specialization

By 1881, specialization and labor-saving machinery had rendered the all-round workman superfluous to so large an extent that William Mather, a representative appointed by Queen Victoria to study American industries, reported:

> The old system of apprenticeship has almost ceased to exist in America. . . . The whole tendency is to engage boys as they do men, only for what they are worth. The evil of this will be severely felt in the future, if not mitigated by great changes in education, for the reason that many boys are obliged to leave school at 14 or 15, and if they are not

> allowed to enter the skilled trades, they will be thrown upon casual employments or unskilled pursuits for temporary gain and a livelihood. . . . It is undoubtedly a shortsighted policy on the part of employees to discourage the employment of boys without aiding those movements which, in the form of industrial schools, would enable a boy to qualify for service at 17 years old at a higher rate of wages than he could probably get at that age but for this training.[2]

"Floating" or "Casual" Labor

Although it was not fully appreciated at the time, we know now that employers suffered enormous losses because of the large floating labor population and the excessive labor turnover then common to all large concerns. A writer in the journal of the International Brotherhood of Machinery Molders pointed out one aspect of this situation in 1893.[3]

> Our apprentice system, if it can be called a system, is little less than barbarous. In many shops there is no attempt made to regulate the working of boys or indeed to attempt to teach them anything other than what they may be able to pick up on their own account. From a false idea of economy, many of our foremen and bosses fill up their shops with boys; they are given some trifling job to do, and in a few weeks they become proficient molders, on brake-shoes or sash-weights—no attempt is made to teach them any part of the trade; they are there for a purpose, that is, to make all they can for the man who employs them, for the lowest possible wages. As soon as the boy begins to think that it is time for him to get an increase in wages he is informed that his time is up and it will do him good to travel and see how things are made in other shops before he settles down. He is turned loose on the country and travels, not always from choice, but oftener from necessity. He is known as an incompetent as soon as he puts his shovel in the sand heap and as soon as the rush is over he is forced to travel. This

[2] Report of the Commissioner of Education, 1882–83, page CLI.

[3] Quoted in Fourth Biennial Report of the Bureau of Labor of the State of Minnesota, 1893-94.

class of floaters is ever on the increase and they are a serious menace to the self-respecting mechanic who endeavors to elevate his calling and secure for himself a more remunerative rate of wages. And that is not all; he is an injury to the boss almost as much as he is to the journeymen. He drifts into a shop in time of a rush, and before he is noticed he has ruined more work than he could make good in a month.

Although the years from 1870 to 1900 mark the lowest ebb of apprenticeship in the United States, at no time has it ever completely died out.

Attitude of Organized Labor

During the nineteenth century, both in Europe and in the United States, organized labor played an important part in maintaining apprenticeship against the forces tending to destroy it.

In England from the time of Edward VI (1547-1553), various laws were passed, directed against combinations of wage-earners for the purpose of securing higher wages and better conditions of work. These culminated in the famous Combination Laws of George III, enacted in 1800, which strictly forbade all combinations, unions, or associations of workmen formed for the purpose of obtaining higher wages or decreasing the hours of work. Although these laws were repealed in 1824, the right to combine in their own interest was not fully enjoyed by industrial workers until after 1871. Nevertheless, organized labor early began to exert its influence upon apprenticeship regulations, and during the last ten years it has been the controlling factor in shaping such policies in Great Britain.

Early Unions

In the United States, the first local craft unions were the Philadelphia Carpenters (1791), the Typographical Society

of New York (1794), the Baltimore Tailors (1795), and the Baltimore Typographical Society (1803). The first labor unions were organized about 1825. At that time industry had not been organized beyond the craft stage, markets were not yet national, and interstate competition was little felt. Accordingly the principal aims of the early unions were to secure better hours, higher wages, regulation of apprenticeship, and the exclusion of "illegal men." Only local and temporary results were achieved and their efforts had no considerable effect upon apprenticeship until the period following the Civil War when strong national organizations were formed. The first national union was organized by the printers in 1850. After this the number spread very rapidly and by 1860, 26 trades had formed national organizations. Fresh strength was given to the movement by the organization of the Knights of Labor in Philadelphia in 1869 and a second impetus came with the formation of the American Federation of Labor in 1886.

Opposition to Specialization

In general, the bargaining power of the unions during the period from 1865 to 1885 was especially directed in opposition to such industrial changes as permitted the substitution of unskilled for skilled workers, workers on highly specialized operations for all-round craftsmen, and machinery for hand labor. It was believed that these changes would constantly create an increasing supply of cheap labor to be added to the immigrants from Europe and the negroes from the South. The unions persistently endeavored to regulate apprenticeship, hoping thereby to increase the number of skilled artisans and stem the rising tide of semiskilled labor.

> The unionists have found that even in a closed shop where all the workers are unionists the solidarity of the group cannot be maintained where the workers are too highly

specialized and lack a considerable degree of craft training. Under such circumstances it is easy for the employer to pit worker against worker, arouse jealousies, and induce individual competition. Hence, in part, the union abhorrence of specialization and their demand for the apprenticeship system.[4]

In spite of the attention devoted by the trade unions to apprenticeship, comparatively few strikes or lockouts have occurred because of disputes over that question. Figure 21 gives the data for the years when labor troubles for this cause were most frequent. Although few in number, apprenticeship disputes were bitterly contested. Moreover, the control of apprenticeship was frequently involved as a subordinate issue in struggles which originated over other matters.

	Strikes	Lockouts
Establishments involved	.95%	7.68%
Losses in wages	2.20	4.33
Assistance given by unions to workmen	4.63	12.99
Losses to employers	3.00	.81
Number of workmen involved	.74	.91

Figure 21. Percentage Figures of Strikes and Lockouts in the United States Due to Disputes over Apprenticeship in Comparison with All Other Causes. (1881 to 1886 Inclusive)

Adapted from the Fourth Biennial Report of the Bureau of Labor of the State of Minnesota, pages 158–161. These figures do not include a number of strikes on railways and in certain other occupations where the term apprenticeship was not used, although this was the matter at issue. The bitter strike of the Chicago, Burlington and Quincy in 1886–87 is a case in point.

Effect of Union Attitude

In considering the effect of the labor unions upon apprenticeship it should be borne in mind that employees in many of the factory trades, such as the rubber industry, have never been organized and that the percentage holding union membership is very low in several other large industries. Another

[4] Hoxie, R. F., "Trade Unionism in the United States," page 292.

important aspect of the matter is that organized workmen, never having had any really satisfactory training themselves, do not know what to demand of employers.

In a few crafts, such as blacksmithing and horseshoeing, and in the majority of manufacturing industries, employers have accepted the responsibility for the training of new workmen and retain almost complete control over apprenticeship. The Boot and Shoe Workers' locals, for example, have rarely done more than limit the number of apprentice cutters, leaving entirely in the hands of the employer the method of training and the length of time required to learn cutting. In a few trades, such as printing and sheet metal construction, the unions have successfully dominated the situation; in still others, such as the building trades, there is a tendency to joint control through arbitration.

An investigation conducted by the Massachusetts Bureau of Labor Statistics in 1906, showed that relatively few of the labor organizations represented in the state had laid definite restrictions upon apprenticeship. Statements made by 134 local and international unions indicated that 59 had no limitations regarding the number, 103 did not limit the age, and 66 did not restrict the term of indenture for apprentices.[5]

The Unions and Child Labor

Child labor is one of the issues closely related to apprenticeship which was early raised between the unions and employers. In 1849 Pennsylvania forbade the labor of children under 13 in textile establishments, and within the next decade a 12-year limit was established in Rhode Island and a 10-year limit in New Jersey and Connecticut. The first provision for special officers to enforce age restrictions was made in a Massachusetts law of 1867, which forbade the employment of

[5] "The Apprenticeship System," Part I of the Annual Report of the Massachusetts Bureau of Statistics of Labor for 1906, page 20.

children under 10 years of age in manufacturing plants. The Workingmen's Party at its congress in Philadelphia in 1876 advocated laws against the employment of children under 14 years of age, and about the same time the Knights of Labor took a stand against employment under 15 years of age in workshops, mines and factories. The American Federation of Labor later indorsed the 15-year standard.

The United States Census of 1870 showed that 739,164 children between the ages of 10 and 15 years were employed in gainful occupations. Of these 114,628 were in manufacturing establishments. By 1880 the number had increased to 1,118,356 children in all occupations. It was due in large part to the insistent demands of organized labor that this undesirable tendency was recognized by most states, and restrictive legislation was passed which caused the number to decline rapidly thereafter.

Trade Union Classes

Although the efforts of the unions were restricted at first to limiting the number of apprentices in proportion to the number of journeymen and to demanding an opportunity to learn all of the "mystery" of the trade, they came gradually to advocate better technical instruction to supplement the practical experience of the shop. Failing in their attempts to get employers to establish schools, several trade union classes were organized during the period from 1907 to 1912. In some cities co-operative agreements were entered into by the employers, the public schools, and the labor organizations. Thus in Indianapolis a reconstructed apprenticeship was established in several different trades. Employers sanctioned two-year day courses in wood-working and sheet metal, while three evening classes beginning in October and ending the following May were established for plumbers' apprentices.

In Rochester, New York, about 1912, an agreement was

entered into between the Rochester Typothetae and the Rochester Shop School. The members of the Typothetae agreed to reserve places each year for a limited number of boys whom the school certified as having satisfactorily completed a preliminary three months' course. During the first two years of his training, the student alternates weekly between the school and the factory, wages being paid for both class- and shop-time. The remaining two years are spent in the factory under the supervision of the school. A similar agreement with Rochester machinists provides a preparatory course of two years, one-half of each day being given to shop experience and the other half to the study of shop mathematics, mechanical drawing, applied science, industrial history, civics, and English.

Apprenticeship and Modern Educational Tendencies

The description of the evolution of apprenticeship given in this chapter remains to be supplemented by a record of the changes brought about during the last decade. Before turning to the account of present-day conditions, we may make appraisal of the effect of apprenticeship upon the learning process in industry and upon vocational education in general.

1. It has been urged that the modern factory system, by destroying the demand for highly skilled craftsmen and by greatly reducing the proportion of workers receiving a comprehensive experience through apprenticeship, has decreased the general enjoyment in work and the pride in creative effort. Quite the opposite is probably true. It is only romantic idealism that pictures the high-grade medieval journeymen and masters as representative of a large part of the population. Thousands were unable to develop the skill necessary to do first-class work and were therefore bound to menial tasks. Factory production offers this middle class of semiskilled workers both interesting and profitable employment.

All told, there is today a larger proportion of fascinating tasks and operations requiring a high degree of skill than at any time during the Middle Ages. Moreover, there is opportunity to work in groups instead of in isolation.

2. Although the earlier forms of apprenticeship are acknowledged to be poorly adapted to the majority of industrial occupations today, some of the best features of this method of training can still be effectively utilized. The factory worker needs to be oriented by some process which will give him the same perspective that the old-time apprentice gained by a long term of service in intimate contact with every phase of the trade. He needs in some way to gain an equivalent appreciation of the importance of his task and to realize the problems faced by his employer and his fellow-workmen. Wherever apprenticeship is abandoned, satisfactory corrections for the resulting deficiencies in training can and must be found.

3. Where apprenticeship persists, as it still does in many trades, some of the undesirable features are direct descendents of European or early colonial customs. Those who propose changes ought to appreciate how deeply rooted trade traditions are and that regulation and improvement can be brought about only by educating the membership of the trade to see the desirability of innovations.

CHAPTER IV

BEGINNINGS IN MODERN INDUSTRIAL EDUCATION

Rise of Factory System

A study of the industrial history of the United States shows that the demand for training employees in connection with large-scale factory production is of comparatively recent origin. Slater's mill, the first textile factory in the United States, was built in Pawtucket, Rhode Island, in 1790, but the factory system really began in the United States when numerous cotton and woolen mills were erected and other manufactures were stimulated as the result of the Embargo Act of 1807 and the War of 1812.

For a period of seven years, domestic manufacturers had a virtual monopoly of the home market. In 1807 there were only 15 cotton-mills in the United States with 8,000 spindles and an annual output of 300,000 pounds of cotton yarn; in 1815, 500,000 spindles gave employment to 76,000 persons with an annual pay-roll of $15,000,000.[1] The first textile factory in the world where all of the manufacturing processes, from the preparation of the cotton fiber to the bleaching of the finished fabric, were carried on by continuous steps in one establishment, was erected in Waltham, Massachusetts, in 1814 by a company organized by Francis C. Lowell of Boston.[2]

The power-loom was successfully utilized in the manufacture of woolen cloth by Rowland Hazard at South Kings-

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[1] Coman, Katharine, "Industrial History of the United States," pages 184-203.
[2] Bullock, Charles J., "Selected Readings in Economics," page 152.

ton, Rhode Island, in 1828. During the next ten years other factories were established in rapid succession in various parts of Rhode Island and Massachusetts. It was not until after 1830, however, that many large-scale enterprises appeared in either cotton or woolen manufacture. The Middlesex Mills were established at Lowell in 1830 with a capital of $500,000, which was soon increased to $1,000,000. In 1845 the city of Lawrence was founded as the center for the Bay State Mills, a wool-manufacturing corporation capitalized at $1,000,000. The Pacific Mills, established in 1853 with $2,000,000 capital, had an annual output by 1860 of 11,000-000 yards of dress-goods.

Labor's Interests Neglected

Although the oldest and one of the most extensive of American factory enterprises, the textile-mills have contributed little to industrial education. Some training has been given for textile factory management and in technical fields, such as applied design and the chemistry of dyestuffs and fabric treatment, but the ordinary worker has received scant attention. Only a minor percentage of the cotton, woolen, and knitting mills have adopted the principles of scientific management; very few have employment managers; and the conditions under which women and children have been employed constitute a national disgrace.

Much the same may be said of the iron and steel industries. Pennsylvania early became the center of iron- and coal-mining and the iron and steel industries. By 1810 the state "boasted 44 blast furnaces, 78 forges, 18 rolling- and slitting-mills, and 170 nail factories where nails and brads were cut by machinery." Because they were basic necessities to the growth of all other manufacturing, these industries increased rapidly and remain one of our chief sources of wealth. Working conditions, nevertheless, have been quite uniformly bad,

and training is neglected save for skilled mechanics, technical experts, and the leading executives.

Despite the rapid development of power-driven machinery and the example of the successful growth of the textile industry, the bulk of general manufacturing continued for many years to be handled by primitive methods. It was not until 1850 that small shops and household labor were displaced in any large measure by the modern production plan.

Pioneer Technical Training

Although systematic instruction for factory employees or for the skilled trades—other than such instruction as an apprentice might receive—was practically unknown in the United States before 1880, technical training of university grade had been begun long before. Schools for scientific research and the education of engineers preceded any attempt at training workmen by more than three-quarters of a century. The class of the Rensselaer Polytechnic Institute graduating in 1835 received the first degrees in civil engineering ever conferred in any English-speaking country. West Point, founded in 1802, was the first institute to lay stress on practical mathematics.

Previous to 1862 there had been established in the United States only five important scientific institutions, namely: Rensselaer Polytechnic Institute at Troy (1824), the Lawrence Scientific School of Harvard (1847), the Sheffield Scientific School of Yale (1847), the Chandler Scientific School of Dartmouth (1857), and the Massachusetts Institute of Technology (1861).[3] Under the Educational Land Grant of 1862, there was opened a new era for scientific studies. Technical educational institutes rapidly increased so that in 1870 there were 21 of good standing. The majority of them

[3] Report of the Commissioner of Education, Vol. I., 1898-99, pages, 873-955.

attained their greatest usefulness in supplying railway, mining, hydraulic, and mechanical engineers during the period of industrial expansion following the Civil War.

Applying Scientific Knowledge

Engineering education began with pure mathematics and natural science and gradually developed the theory of applied mathematics and applied science. For many years students were taught through lectures, problems, and text-book study, not by experiment and demonstration in a laboratory. About 1876, the agitation for a practical engineer who should unite in one person the skill of the artisan with the scientific knowledge of the older type of engineer led to the establishment of shop practice or technical instruction to supplement theoretical training. At the same time, studies of a similar character found a place in the preparatory training of persons of high school age because of the realization that the United States was far behind European countries in trade education. Vocational preparation for the mechanic, the skilled machine operative, even the factory executive, had been everywhere neglected. Mechanical drawing, applied science, and shop mathematics were nowhere taught in the public schools, and only a few institutes had attempted instruction in the mechanic arts.

Popularizing Vocational Education

The demand for vocational education in secondary schools was foreshadowed in the aim of the English Classical High School, as set forth in the regulations of the Boston School Committee: "To fit . . . the young men of the city not intended for a collegiate course . . . for active life or qualify them for eminence in private or public station." Over sixty years of devotion to the ideal of college preparation were to elapse before any adequate beginnings were made toward

realizing this practical aim. The first industrial trend in secondary education appeared with the introduction of drawing and manual training. At first the values claimed for both of these subjects were largely vocational and technical. Horace Mann strongly advocated the teaching of drawing in his Seventh Annual Report, issued in 1844.

> For the master architect, for the engraver, the engineer, the pattern designer, the draftsman, molder, machine-builder, or head mechanic of any kind, all acknowledge that this art is indispensable. But there is no department of business or condition in life where this accomplishment might not be of utility. . . . Whatever advances the mechanic and manufacturing arts is especially important here.

At the time of the London Exhibit in 1851, in which drawing and designing received much attention, both Great Britain and the United States were made more fully aware of their lack of technical education and of the advantages possessed by Continental Europe because of the excellent training offered there in such subjects.

Vocational Training in the Public Schools

The California Statutes of 1851 included drawing in the list of subjects required to be taught throughout the state. Cincinnati added drawing to its curriculum in 1862. In 1870 the Massachusetts legislature passed a law which placed drawing among the subjects required to be taught in the public schools. This legislation came in response to an urgent appeal from the manufacturers who keenly felt the need of skilled workmen familiar with the elements of drafting and designing.

Manual training appeared in European schools as early as 1858. In 1871, instruction in both wood and metal was given for the first time in the United States in the shops of the Illinois Industrial University, later the University of

Illinois. The next year Dr. C. M. Woodward organized manual training classes at Washington University in St. Louis.

At the Centennial Exhibition in 1876, the exhibit of the Imperial Technical School of St. Petersburg attracted much attention. The basis of the Russian method, which had been evolved in an engineering school, was the analytic study of a trade or art in order to discover typical elemental processes which could be presented in an organized course as short exercises. With this method to follow, and spurred on by the poor showing which American products had made at the Exposition in comparison with foreign goods, manual training and drawing developed rapidly. In the great majority of elementary and secondary schools, however, these subjects still possess little if any direct vocational value. Wide-spread acceptance of them could not be secured on the industrial basis. Traditional practices and the lack of trained teachers acted as a barrier until cultural and disciplinary values of a general nature were used as arguments for their introduction. Only within the last few years has there been a distinct tendency in the direction of relating this work more closely to occupational needs.

The Manual Training High School

Through the efforts of Dr. Woodward, the first manual training high school was opened at St. Louis in connection with Washington University in 1880. This school offered the usual high school subjects, with the exception of the classics, in addition to various lines of shopwork and mechanical drafting. High schools of a somewhat similar type were established in Baltimore and Chicago in 1884; Philadelphia, 1885; Omaha and Cleveland, 1886.

At the time of the establishment of the St. Louis Manual Training School, Governor T. T. Crittenden, of Missouri, spoke of the need for industrial education.

The following quotation from his address is from the report of the Commissioner of Education, 1882-83 (page CLVII).

> The old system of apprenticeship is about at an end, and it is necessary, if we propose to protect the interests of our industries and consult the welfare of our youth, to devise some means for their proper training. In our ordinary and more advanced schools the only vocations aimed at and in which positive interest is aroused are commerce, buying and selling, banking, reckoning accounts, keeping books, and the so-called "learned professions." The ordinary schoolboy gets the idea that it requires no education to be a mechanic; hence he aspires to what is called a higher profession, a higher avocation, and foolishly learns, from vicious sources, to despise both craft and craftsmen. If this pernicious tendency can be corrected and the dignity of skilled labor and skilled workmen be maintained by the introduction of manual training into grammar schools of high grade, great good will be accomplished. I have no hesitancy in directing attention to this manual school as one of our educational ornaments, worthy of the patronage of our sons and the respect of our citizens.

Two Theories of Shopwork

Shopwork as an educational method developed under two radically different theories. The report of the Commissioner of Education[4] contains this explanation:

> Under one theory, which is very ably demonstrated by Dr. C. M. Woodward in his manual training school at St. Louis, shopwork is simply one means, with many others, of training the whole man. It is primarily disciplinary. As stated in his own words: "An exercise, whether with tools or with books, is valuable only in proportion to the demand it makes upon the mind for intelligent, thoughtful work. In the school shop the stage of mechanical habit is never reached; the only habit is that of thinking." Such a train-

[4] Vol. I, 1898-99. (Pages 873-955).

> ing, in its relation to acquisition, is defined in a further quotation from Dr. Woodward: "We have distinctly stated that our pupils do not become skilled mechanics, nor do we teach the full details of a single trade. The tools whose theory, care, and use we teach are representative, and the processes, employed just far enough to make every step clear and experimentally understood, equally underlie a score of trades."
>
> The other theory is that education in the shop should be for definite acquisition. Where the acquisition requires a specific skill, and the training is more especially in mechanical habit, we have what is generally called industrial education. Where the object is to familiarize the student with how a thing is done rather than specific manual skill in a particular thing, and where the approach is from the scientific side, so that all construction is connected with general principles of design, we have what is generally called technological education. The term technical education is variously used, but if it could be given any exact meaning it would imply a shop education somewhere between the industrial and the technological.

Trade schools, both public and private, grew up in response to the demand for training in "specific skill"; developing side by side with the trade schools were the public manual training and technical high schools (discussed in Chapter VII), co-operative part-time schools, and continuation schools.

Instruction for a Specific End

Pupils of high school age desiring to enter the mechanical and electrical trades or the art industries, or to prepare for home-making employments have received attention in such schools as the New York Trade School founded in 1881, the Drexel Institute (Philadelphia, 1891), Pratt Institute (Brooklyn, 1887), Wentworth Institute (Boston, 1911), the Lick (California School of Mechanic Arts), Wilmerding, and Lux Schools (San Francisco, 1895, 1900, 1912), and the Lewis

Institute of Chicago (1877). All of these schools aim to offer highly specialized instruction for persons planning to enter a particular occupation; very little of their work is of such a general character as to apply to any considerable group of industries.

Technical schools of secondary grade offering work applied directly to the industries developed first in connection with the manufacture of textiles. The Textile School of the Pennsylvania Museum at Philadelphia opened in 1884. Massachusetts established state-aided textile schools at Lowell in 1895, in New Bedford in 1895, and at Fall River in 1899. In many respects the textile schools of this type correspond quite closely to the middle technical schools of Germany.

The Polytechnic High School

The field between the manual training high school and the technical institute has been occupied quite recently by the technical or polytechnic high school. Because of the uncertainty of aim on the part of the founders and because of the great number of overlapping subjects which have been introduced, it is exceedingly difficult in many cases to draw any sharp line of distinction between the technical school and the general high school on the one hand, and the manual training or manual arts school on the other. Several of our technical high schools were first organized as manual training institutions and only gradually adopted their present technical program. Thus the Stuyvesant High School in New York was distinctly a manual training school until about 1909 or 1910. Previous to 1910, the Lane Technical High School (Chicago) offered very much the usual type of four-year manual training course to the boys of the district. There was a distinct effort, however, from the beginning to make the work practical and to organize it in such a way as to provide training of vocational value to boys who left at the end of the second year.

Part-Time Education

Dean Herman Schneider of the department of engineering of the University of Cincinnati organized the first class under his well-known plan of co-operative training in 1906. The students received their academic and technical training one week in the university and worked the next week in the shops of co-operating employers. By grouping the young men in pairs, so that one was in the school while the other was in the shop, both school and shop work went on without interruption. Fitchburg, Massachusetts, applied the method to high school students in 1908, and Beverly, Massachusetts, established a state-aided co-operative class in connection with the United Shoe Machinery Company, in 1909.

Continuation Schools

Superintendent Frank B. Dyer of Cincinnati, Ohio, established one of the first continuation schools in the United States in 1909. It was a day school for machinist apprentices, offering a four-year course in drawing, mathematics, shop science and theory, English, commercial geography, and civics. Students attended one-half day, four hours, each week and were paid the usual wage for the time by their employers.

The Boston School Committee opened continuation classes in 1910 for young people employed in the shoe and leather industry, the dry-goods industry, and department stores. Three years later the Massachusetts General Court enacted permissive legislation which enabled school committees to establish compulsory continuation schools for workers between the ages of 14 and 16, but no city in the state outside of Boston has yet taken advantage of the opportunity (1919). In Boston each employed minor under 16 years of age is required to attend day continuation classes four hours each week.

In May, 1910, Ohio passed a law similar to the Massachusetts act, providing for classes for boys, except eighth grade graduates, between 8 A.M. and 5 P.M., not to exceed 8 hours each week. Classes are held only during the regular school term. Attendance is compulsory upon the establishment of a continuation school by the local authority. Cincinnati opened continuation schools in May, 1911, which required four hours' attendance each week. Cleveland began similar work in the same year, requiring six hours' attendance per week. In New York City, the first day continuation classes were established under the Wilmot Law, passed by the state in 1913, in the department store of Abraham and Straus in Brooklyn. By 1916, 38 classes were in operation in department stores, hotels, candy factories, manufacturing plants, and repair-shops.

The Wisconsin Plan

A Wisconsin law passed in June, 1911, provided for public industrial, commercial, continuation, and evening schools. As modified by legislation enacted in 1915, these four types of schools are defined as follows:

1. Industrial schools include part-time day classes for apprentices over 16 years of age and all-day instruction for persons 14 to 21 years of age. School attendance is required of apprentices up to 18 years of age according to the terms of the state controlled indenture.

2. Continuation schools are for all persons 14 to 16 years of age employed on labor permits, in domestic service, or at home. Attendance 8 hours per week for 10 months each year is compulsory. Those who are 16 but under 17 years of age are required to attend part-time school not less than 5 hours per week for 6 months in the year.

3. Commercial schools offer instruction for temporarily unemployed persons over 16 years of age, or for acceptable pupils who wish to prepare for salesmanship or accounting.

4. Evening classes are attended voluntarily by persons over 16 years of age.[5]

Cox Child Labor Act—Pennsylvania

The Cox Child Labor Act, passed by the Pennsylvania Legislature in 1915, requires employed minors between the ages of 14 and 16 to attend continuation schools, where established, 8 hours per week. Classes must be organized in every community where 20 or more children of the specified age are employed. The Pennsylvania legislation differs from the Wisconsin law in limiting children under 16 to 51 hours of labor per week, including the time spent in school. Wisconsin allows but 48 hours of work but requires only 8 months of school attendance, thus making the net working hours practically the same in both cases.

Difficulties

The chief fault of continuation education is that no plan has been devised for combining civic and general academic studies with technical or shopwork designed to help the pupil to make progress in his employment. Except in the metropolitan areas, it is often impossible to organize classes of economic size including only pupils having common vocational interests. The diversity of employment makes it difficult to secure practical teachers, and only a few manufacturers are yet ready to co-operate by providing facilities for classes within the plants so that commercial shopwork can be attempted, or other instruction directly related to the plant's activities can be planned. For these reasons the teaching is strongly academic, and children attend because they are compelled to, not because they hope to profit by the opportunity.[6]

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[5] Report of the Commissioner of Education, 1915, Vol. I, page 234.

[6] For a digest of the hours of employment, continuation school regulations, and other legislation affecting minors, see "The States and Child Labor," Children's Year Leaflet, Children's Bureau, United States Dept. of Labor, No. 13, April, 1919.

Corporation Schools

The first school maintained by an American business house was organized by the R. Hoe Printing Company of New York in 1875. Very little was accomplished toward developing corporation schools until about 1905, when a considerable number of concerns began to develop this neglected phase of management. Eight years later the National Association of Corporation Schools held its charter meeting at New York University as the result of a general invitation issued by the New York Edison Company and the National Cash Register Company of Dayton, Ohio. Forty-eight concerns were represented, but not all of these had organized schools. In fact, outside of the railroad apprentice schools, there were probably less than twenty-five well-established corporation schools in the United States at that time.

Employment or personnel management became an important factor in administration after about 1912 when the first association of employment managers was formed in Boston. With the rise of a group of executives whose primary interests are the reduction of labor turnover and the increasing of output by solving problems of human engineering, renewed attention was given to the training of employees and new methods for training foremen and minor executives were proposed. The foreman's position in particular was subjected to close scrutiny and limitations were placed upon his authority over the selection, training, and discharge of employees. Several concerns introduced training courses which for the first time emphasized the management of employees as one of the foreman's most important tasks.

Industrial training in the shop and factory received its next impetus at the beginning of the World War. Faced with an inadequate supply of skilled labor and the supreme need for an unprecedented volume of output, manufacturers and shipbuilders, assisted by government departments, turned to

vestibule training and other forms of intensive instruction. New methods were devised for preparing instructors as well as operatives and hundreds of classes were organized to train an industrial army for service overseas as well as to keep the wheels turning in our factories and shipyards at home.

Labor Organizations and Industrial Training

Organized labor entered the field of industrial training in 1907. A commission appointed then by the Hot Springs Convention of the International Typographical Union reported:

> . . . . that in the average shop the opportunities for thoroughly learning the trade of printing did not exist. Specialization kept some printers indefinitely on one kind of work and provided but a narrow field of instruction for the apprentice. This circumstance had resulted in a perceptible decrease in skill among printers, who were practically given no opportunity to acquire the mastery of their trade. A second result of this lack of a general training was the necessity of calling on outsiders for some of the work which it was asserted rightfully belonged to the printers. These outsiders are the professional designers, who are trained in art schools, where they have learned the principles of lettering, design, and color harmony, and have been given opportunity to exercise originality.
>
> With all these considerations in view the typographical union realized that the printers needed technical education, and as a central school was not possible, the idea of the correspondence school was adopted as the only practical means of effecting the desired change. The typographical union did not propose "to make printers but to give apprentices, journeymen, and even master printers an education supplementary to that of the printing office." [7]

Apprentice schools and courses giving supplemental technical education were established during the period from 1907 to 1910 by the Photo-Engravers Union, the Carpenters and

[7] Report of the Committee on Industrial Education of the American Federation of Labor. 62nd Congress, 2nd Session, Senate Document No. 936, page 29.

Bricklayers of Chicago, and the Carriage, Wagon, and Automobile Workers' Union of New York City. A little later other classes were started by the public schools in several cities as the result of arbitration agreements.

The common attitude of organized labor toward industrial training in public and private schools was expressed in 1909 by John Golden, then President of the United Textile Workers of America.

> I shall at all times, so far as I am individually concerned, oppose the trade school which attempts to turn out a full-fledged bricklayer, carpenter, or machinist, in a few months' time and for a certain price. It will not alone lower the standard of any industry, but is detrimental to the boy's own interest. He who is given such an education, making of him a "half-baked" journeyman, as it were, by a process which converts the school into what is commonly known as a "scab hatchery" is not a needed acquisition to the ranks of labor. On the other hand, I shall always be glad to co-operate in any movement which tends to place our industries on a higher plane, to open up better and more opportunities for your boy and my boy to acquire an industrial and technical education which will enable him to fight life's battles better equipped than we were. In such a movement I feel safe in saying organized labor is with you heart and soul.[8]

Organized labor, both in Great Britain and in the United States, has recently issued declarations favoring vocational guidance, continuation education, improved opportunities for trade and technical training, national support for vocational education, and the extension of compulsory age limits for school attendance. Union labor is represented on the Federal Board for Vocational Education and has had a large share in shaping the policies of the Dilution and Training Service and the Working Conditions Service under the Department of Labor.

[8] Golden, John, "The Position of Labor Unions Regarding Industrial Education." The Annals of the American Academy of Political and Social Science, January, 1909, page 187.

CHAPTER V

NATIONAL AND STATE AID FOR VOCATIONAL EDUCATION

National Land Grants for Education

The principle of national aid for education was first developed in connection with land grants. The majority of these date back to the Ordinance of 1787, which reserved one lot in sixteen in every township for the maintenance of public schools. With the admission of Ohio in 1802, further precedents were established by giving the new state certain salt springs and 5 per cent of the net proceeds of the sales of all public lands within the state, in addition to the sixteenth section in each township. A number of grants were made during the next century. Part of the surplus revenue in the United States Treasury in 1837 was utilized for educational purposes. Of this amount, a fund of $7,500,000 still remains, the interest being devoted entirely to schools.

Land Grant Act of 1862

The first significant national assistance to be given to industrial education was received through the Morrill or Land Grant Act signed by President Lincoln in July, 1862. This measure donated to each state land-scrip amounting to 30,000 acres for each senator and representative then in Congress. The income from the sale of the land was to be used in each state "for the endowment, support, and maintenance of at least one college, whose leading object shall be, without excluding other scientific and classical studies and including military tactics, to teach such branches of learning as are

related to agriculture and the mechanic arts . . . in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." The majority of the states used the funds to support their existing institutions and observed the provisions intended to establish practical training in a purely perfunctory fashion. Only one state, Massachusetts, established a college devoted entirely to agriculture. Engineering was stimulated in many colleges, particularly through the West and Middle West. For the first two decades agriculture as well as industry derived but little practical benefit from the act, but owing to stimulation from other federal and state funds, agriculture became well recognized and was taught in thoroughly practical ways after about 1890.

Federal Appropriations for Education

The Hatch Act of 1887 appropriated $15,000 in cash to each state for agricultural experiment stations, and the second Morrill Act of 1890, provided an annual cash appropriation of $25,000 to each state for teaching purposes. The Nelson Amendment of 1907 duplicates the amount appropriated by the second Morrill Act. Since 1908 many localities have had a considerable income from the forest reserves, 25 per cent of the income of each national forest reserve being appropriated for the benefit of schools and roads within the district in which the reserve is situated. The total income from federal grants thus far mentioned is estimated at $830,520,000 by 1920.[1] Approximately $599,000,000 of this has been used for common schools, $200,920,000 for higher education, and $30,600,000 for normal schools and special institutions.

The Smith-Lever Act

The Smith-Lever Act, passed in 1914, gives federal aid

[1] Monroe, Encyclopedia of Education, Vol. IV, page 382.

to state agricultural colleges for co-operative agricultural extension work carried on in connection with the Department of Agriculture. This work is designed especially for persons not attending or not resident at agricultural colleges and is given by means of farmers' institutes, movable schools, lecture courses, correspondence courses, and other similar methods. The sum appropriated each year began with $10,000 for each state and is increased annually until a total yearly appropriation of $4,100,000 is reached. The final basis for appropriation will be the proportion that the rural population in each state bears to the rural population of the whole country.

The Smith-Hughes Act

The early federal acts imposed but few restrictions upon the states in the use of national funds for educational purposes. The Smith-Lever Act differed from the earlier enactments in the nature of its specific and exacting requirements upon the states. Still more exacting are the provisions of the Smith-Hughes Act passed in 1917. This act calls for the appointment by the President of a representative Federal Board for Vocational Education. The membership includes the Secretary of Agriculture, the Secretary of Commerce, the Secretary of Labor, and the Commissioner of Education, together with three citizens who are selected as representatives of the interests of labor, manufacturing and commerce, and agriculture. The representatives appointed for the first year were Arthur E. Holder, representing labor, Charles E. Greathouse, representing agriculture, and James P. Munroe, representing manufacturing and commercial interests. The board appointed as its executive head Dr. Charles A. Prosser, formerly director of Dunwoody Institute, and secured the services of a large staff of technical experts and clerical assistants.

The Smith-Hughes law provides a fund for the main-

tenance of the executive staff and appropriations to the states totaling $2,307,460.44 for the year 1918-19. The amount available for state appropriations increases annually, so that the fund available for all purposes in 1925-26 and yearly thereafter will be $44,934,176. This sum is to be matched dollar for dollar by the states to which it is appropriated, thus doubling the total amount to be expended.

Three Uses of Federal Funds

The states may use the federal funds for three different purposes:

1. The payment of salaries of teachers, supervisors, and directors of agricultural subjects.
2. The payment of salaries of teachers of trade, home economics, and industrial subjects.
3. The training of teachers of agricultural, trade, home economics, and industrial subjects.

Federal Policy

The funds available for trade and industrial purposes are not definitely separated from those to be used for teachers of home economics in the announcements so far made, although the act provides that no state may use more than 20 per cent of the total for home economics. For the fiscal year ended June 30, 1918, the sum of $500,000 was appropriated to the states for the two purposes. This amount will be increased annually by $250,000 for six years and by $500,000 for the seventh and eighth years, until a maximum sum of $3,000,000 is reached for the year ending June 30, 1926. A like amount will then be appropriated each year thereafter. Industry will also profit by the appropriations made for training teachers, and since agriculture and home economics have already been well developed in many sections,

it is only reasonable to expect that as soon as the states are ready to utilize the money effectively, a large proportion of it can be devoted to the training of teachers of industrial subjects.

Restrictions Imposed on State

Before funds can be received by a state, its legislature must accept the federal act, and a plan for the organization and maintenance of schools and classes must be adopted by the state board of education and be approved by the federal board. All of the states have accepted the provisions of the act and have established executive boards for conducting their work in vocational education. The state plan is approved for one year only and constitutes an agreement between the state board and the federal board to establish and maintain classes under the conditions and standards agreed upon. The legal provisions relative to different types of industrial schools or classes provided for in the act and established by the interpretive decisions of the federal board are in brief as follows:

1. The controlling purpose of such education shall be to fit for useful employment.
2. Such education shall be of less than college grade.
3. Such instruction shall be designed to meet the needs of persons over fourteen years of age who are preparing for a trade or industrial pursuit or who have entered upon the work of the trade or industrial pursuit.
4. The state or local community, or both, shall provide the necessary plant or equipment determined by the state board, with the approval of the Federal Board for Vocational Education, as the minimum requirement in each state for education in any given trade or industrial pursuit.
5. The state board must prepare plans showing the course of study, methods of instruction, and qualifications of teachers, which must be approved by the federal board.
6. In part-time schools or classes any subject may be given which is intended "to enlarge the civic or vocational intelligence" of the students who attend.

Possibilities Under Federal Act

Six types of industrial schools or classes may be organized under the federal act: unit trade schools, general industrial schools in cities under 25,000, part-time trade extension classes, part-time trade preparatory classes, part-time general continuation schools, and evening industrial classes. The main interest of the Federal Board for Vocational Education up to the present time has been evidenced in establishing what are known as short-unit courses, that is, brief intensive courses designed to prepare workers for specific operations or occupations. During the war period, assistance was given to the shipyards, munition plants, and other industries engaged in war work in the preparation of plans for giving instruction in many such courses. Evening classes and intensive day instruction for army mechanics and technicians were also established in many instances with the advice and co-operation of the agents of the federal board. Both for these purposes, and to assist in the task of establishing vocational education throughout the country on a peace-time basis, a number of bulletins have been published giving trade analysis and outlining desirable methods of organizing and conducting schools and classes.

Financial Aid to Corporations

Except in states where local legislation makes it impossible to give state grants to private institutions, it is possible to use Smith-Hughes money for trade extension part-time schools, trade preparatory part-time schools, or general continuation part-time schools conducted in connection with private corporations. The only limitations are that the schools or classes be under the supervision of the public school authorities, that the time devoted to instruction be not less than 144 hours per year, and that the school equipment, methods of instruc-

tion, and qualifications of the teachers conform with the plans drawn by the state and approved by the federal board.

Each corporation must face for itself the matter of adjusting its educational requirements to suit the plans proposed by the state authorities and the federal board. The corporation has the advantage of a material reduction in the cost of maintaining instruction, and by undertaking co-operation in this way is enabled to have a more direct effect upon the trend of local educational effort and to encourage a demand for state laws providing better industrial education. The chief disadvantage of the arrangement lies in the occasional inability of school authorities to grasp the actual needs and technical requirements of the educational situation in the shops. The persons selected as supervisors of industrial education have not always been prepared to assist instructors nor to give such advice to their executive boards as would lead to the planning of practical courses. It has also been a common experience to find teachers appointed by public school authorities who were unfitted by temperament or experience for training employees.

The Physically Handicapped

The Vocational Rehabilitation Act, or Smith-Sears law, approved June 27, 1918, places upon the Federal Board for Vocational Education the responsibility for the vocational guidance, occupational re-education, and placement of men disabled in the nation's service during the war. A notable contribution should be made to industrial education by the work done under this act in retraining and adjusting to suitable employment the men who were physically handicapped through war injuries. The federal board and co-operating agencies have made surveys of many industries in order to discover vocational opportunities appropriate to various types of disabilities and to assist in formulating training programs.

The results attained show the tremendous possibilities of constructive legislation and educational effort in behalf of industrial cripples. The public responsibility in the matter is attested by the fact that in 1916 there were approximately 500,000 industrial accidents in the United States which caused the worker to lose four weeks or more from work. Pennsylvania reports an annual accident toll, including minor injuries, of 250,000. During the first four years of the administration of the Massachusetts Workingmen's Compensation Law, approved in 1912, nearly 417,000 injuries were reported and $11,000,000 was paid out in compensation and medical benefits.

Massachusetts has already accepted the responsibility by establishing a bureau under the State Industrial Accident Board and appropriating a fund of $10,000 for educational activities and vocational guidance for physically handicapped persons. National legislation has been drafted which proposes to place this work throughout the United States under the jurisdiction of the present Federal Board for Vocational Education.

Work of Federal Bureau of Education

Previous to the establishment of the Federal Board for Vocational Education, the Bureau of Education of the Department of the Interior encouraged industrial education in various ways. It aided states and communities to introduce programs for vocational education by outlining plans for the training of teachers and holding conferences on the methods and practice of manual training and trade education. The staff of the bureau carried on several educational surveys which studied local industrial conditions as the basis for a comprehensive plan of vocational training. Surveys directed by the bureau have been published for the state of North Dakota, for San Francisco, for Elyria, Ohio, and for Wilmington, Delaware.

Mimeographed circulars and printed bulletins have been distributed which deal with current topics in vocational education and describe plans which have been found successful in different localities.

Backwardness of States

At the time of the passage of the Smith-Hughes Act, only 8 of the 48 states had developed for themselves systems of industrial education. These states were Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Indiana, Wisconsin, and California. Their laws give state financial assistance to vocational schools, and provide for the supervision of employed minors. Industrial education under state control has been for the most part concerned with continuation schools, trade schools, and high schools of polytechnic, manual training, and technical types. The limitations of the concept of industrial education held by the public as well as by the majority of educators is shown by the small number of trade schools and extension classes established, and by the fact that the training which they afford as well as the instruction given by technical institutions has been adapted to only a few classes of workmen. The skilled trades, such as carpentry, sheet metal work, pattern-making, the foundry trades, and electrical work, have been given considerable attention, but only in rare instances has there been a successful effort to meet the needs of the larger manufacturing concerns or the diversified industrial interests of an entire state or city.

Previous to 1918, only two states, Massachusetts and Indiana, had recognized the necessity for training teachers of trade and industrial subjects by organizing the work on a practical basis under state supervision. Following the creation of the Federal Board for Vocational Education, other states were induced to undertake this work, but it is still far from being on a satisfactory basis. Teachers of vocational

subjects are rarely paid as much as skilled mechanics and the demand for teachers is not sufficiently well defined to justify practical men in undertaking teacher training courses.

Need of Co-operation

A classification of the agencies for industrial education may be found in Appendix K. It is apparent that industrial training is being administered by a variety of conflicting and overlapping agencies. Technical classes are now being conducted by:

1. Public schools
2. Private, philanthropic, and endowed institutions
3. Organized labor
4. Private industrial enterprises

There is need for some stimulating unifying agency which can bring about co-operation and more purposeful effort. A more detailed examination in later chapters of the organization of schools and classes and the methods of training will show still greater divergence of opinion as to aims and technique, dangerous gaps in the educative process, and the prevalence of dispersive and at times misdirected efforts.

CHAPTER VI

TECHNICAL SECONDARY SCHOOLS AND CLASSES

Development of High Schools

During the last decade a phenomenal development has occurred in our American high schools. From 8,031 schools with 722,692 pupils in 1906, the numbers grew to 12,003 schools with 1,456,061 pupils in 1916.

Rapid as the growth of secondary schools has been in the United States, it has been more than equaled by the increase in the number of courses offered and the students enrolled in various vocational or practical subjects. In many quarters a well-defined effort has been manifest to make the public high school in fact what it already was in name—the people's college. Nevertheless, these efforts have been directed in the main toward introducing courses in commercial subjects, agriculture, domestic arts, and applied design. The only work which can in any measure be said to apply directly to the training of those who enter the industries has been that which has characterized a relatively small group of schools known as manual training or technical high schools.

Complexity of Secondary Schools

In the United States at the present time there are about sixty such high schools. About half of these are definitely described by name or by implication in their reports and catalogues as polytechnic or technical schools. No definite statement of the exact number in each group is possible, owing to the confusion of opinion as to just what constitutes a secondary school of each type. Several of the so-called

technical high schools can scarcely be distinguished from the composite or general high school which offers courses in applied science and mathematics and gives some shop instruction. A few of the manual training schools are dominated by the requirements for college entrance whereas others have introduced practical courses similar to those offered by the technical institutions. It is the purpose of the discussion which follows to describe the growth of these schools, to give an account of their courses of study and methods, and to interpret their aims and tendencies in the light of their present opportunities.

Meaning of Term "Technical Education"

As applied to education in many quarters, particularly in England and Canada, the word "technical" has been used to describe almost any kind of study which is neither elementary nor purely literary or classical. It may include cookery, needlework, foreign languages, bookkeeping, photography, mathematics, science, art, and a variety of shop subjects, though on the whole the idea of training for a craft predominates. In England most of the technical schools have for their principal object the teaching of actual industrial principles and methods. In Germany and Switzerland the "Technicum" is a specialized trade school which gives a large amount of attention to applied science, mathematics, and drawing, while the technical high school is practically equivalent to our engineering colleges.

As used in this discussion, technical education implies a form of instruction which emphasizes the applications of science, mathematics, drafting, design, and economics to industry and at the same time offers practical experience through shops, laboratories, and part-time employment. It usually includes preparation for citizenship and instruction in English, modern languages, and history. The main divisions of tech-

nical education are those related to agriculture, commerce, industry, and domestic employments; the term implies an emphasis upon the scientific principles underlying each occupation rather than upon the acquisition of skill or practical knowledge.

Vocational Schools Classified

A committee of the National Education Association, appointed in 1913, after some three years devoted to a consideration of the subject, offered the following nomenclature for use in designating the type of vocational secondary schools.[1]

Analysis of Types of Vocational Schools in the United States

A. Agricultural schools
- 1. Vocational agricultural schools
  - (a) Full-time day school
  - (b) Part-time school
- 2. Practical arts agricultural school
- 3. Farm extension schools

B. Commercial schools
- 1. Vocational commercial schools
  - (a) Full-time day school
  - (b) Part-time school
- 2. Commercial arts schools
- 3. Evening commercial schools
  - (a) Vocational commercial evening school
  - (b) Commercial arts evening school

C. Industrial schools
- 1. Vocational industrial day school
- 2. Vocational part-time industrial schools
- 3. Evening industrial schools
  - (a) Vocational extension industrial school
  - (b) Vocational preparatory industrial school

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[1] Vocational Secondary Education, Bulletin, 1916, No. 21, Bureau of Education.

    4. Industrial arts schools
    5. Continuation industrial schools
        (a) Extension industrial continuation school
        (b) Preparatory industrial continuation school
D. Home-making schools
    1. Vocational home-making schools
        (a) Full-time day school
        (b) Part-time home-making school
    2. Evening home-making schools
        (a) Vocational extension home-making school
        (b) Vocational preparatory home-making school
    3. Household arts school
E. Technical high schools

Aims of Three Types of School

A committee on the place of industries in public education reporting to the National Council of Education in 1909 endeavored to differentiate between manual training and technical high schools and to define the scope and aims of certain other vocational schools. A portion of the report of the Commissioner of Education for 1910, Volume 1, reads as follows:

> The *manual training high school,* or the *manual training school,* is a school of secondary grade in which more or less handwork is included in the curriculum but in which the greater part of the academic instruction is similar to that found in other high school and college preparatory schools, neither the manual nor the academic instruction being especially planned to be of direct vocational service.
>
> The *secondary technical school,* or the *technical high school,* is a school of secondary grade having the distinct purpose of preparing its pupils for industrial leadership—that is, for positions in industrial life requiring skill and technical knowledge and of greater importance and responsibility than those of the unskilled mechanics. In such a school the instruction deals not only with the important manual operations, but also with those principles of science and mathe-

matics and their direct applications to industrial work that will help to prepare the student for successfully mastering the more fundamental processes and problems of those groups of industries which the school is designed to reach.

The *trade school* and the *preparatory trade school* are schools which have for their definite purpose the preparing of boys or girls for entrance to the skilled mechanical trades and which deal with their pupils during a briefer course and allow for earlier preparation for practical work than the technical high school. Such schools place their greatest emphasis upon practical handwork instruction under conditions resembling as closely as possible those prevailing in commercial practice. Such schools relate the academic instruction at every point closely to the practical work and include little that is not of direct bearing on tradework.

Aims of Technical High School

This commitee states the aims of the technical high schools as follows:

> These schools are the schools which were organized largely as a result of the movement for manual training in the schools. They offer general courses in machine-working, wood-working, and other forms of manual work. The academic work is also somewhat closely related to the work carried on in the shops. In most cases and more particularly in the first two years of these schools, the academic work is general rather than specific. There would probably be very little direct effort to teach specific occupations. These schools sometimes may be said to prepare pupils for the higher technical schools and for courses in engineering in these higher technical schools.

Diversity of Aims

1. *Cleveland, Ohio.* An example of the conflicting purposes and uncertain aims of those who have established and maintained technical high schools is offered by the catalogue

of the East Technical High School of Cleveland which contains the following historical statement:

> The Cleveland East Technical High School was built as a result of a survey by a commission appointed by the Cleveland Board of Education, February 29, 1905.
>
> The findings of the Educational Commission were embodied in a series of reports submitted to the Board of Education during the years 1905 and 1906. On September 26, 1905, the following resolution was adopted:
>
> "That the Educational Committee of this Board be hereby instructed to investigate the advisability of establishing a Manual Training School in this city and that it be empowered to extend its investigation to other cities as it may deem wise and that the expense of such investigation be and is hereby authorized by this Board."
>
> On Monday, March 5, 1906, the Board of Education unanimously adopted a resolution authorizing the issue of bonds for $350,000 for the purpose of erecting a Manual Training High School. A marked change as to what should be the policy of the school subsequently led to a change from the name as above proposed to the present one, *The East Technical High School of Cleveland.*

The following comments made by principals of high schools will serve to illustrate the present tendencies of development for manual training and technical high schools.

2. *Kansas City, Missouri.* Porter Graves, principal of the Manual Training High School, Kansas City, Missouri, made the following statement in 1918 about the work of his own school:

> The difference between this Manual Training High School and the cosmopolitan high schools in Kansas City is this: The Manual Training High School requires in addition to the standard requirements for all high schools, two years of manual training and two years of drawing. The boys, of course, take shopwork or printing and mechanical

drawing, and the girls take two years of cooking, two years of sewing, or a year of each and two years of free-hand drawing. These manual training and drawing requirements were laid down by the original faculty in this school in 1897 and have never been changed. I find that the manual training and drawing requirements in the business course handicap us in developing that course, but I have not yet seen a way to change them.

After it is all analyzed, this school is as much of a college preparatory school as any of the other high schools in this section of the country and stands on the same plane in relation to the colleges.

We have made some little attempt to vocationalize certain courses but the school as a school is essentially a high school.

Our manual training equipment for boys is probably as good if not better than that in the nearby universities. The equipment for girls is not as good as that in the newer high schools in Kansas City.

Our school is located on the edge of the business district and many of our boys and girls are attracted by the offices or driven to them for economic reasons and are working part-time. Out of a thousand people that are still in school, a census taken just after the holidays shows that 287 of our boys and girls are doing part-time work and making a total of a little over twelve hundred dollars a week.

3. *Providence, Rhode Island.* G. H. Eckels, Principal of the Providence Technical High School, made the following statement in 1918 about the work of the school along vocational lines:

With reference to aims, whatever may have been the purposes in the minds of its founders, and in spite of the aims held to by some in authority, in practice the school is simply giving boys a good general education with considerable hand training that is prevocational rather than really vocational. An exception is our co-operative industrial course. Girls have considerable work in domestic science and arts, but none of it strictly vocational.

4. *Lane Technical School, Chicago, Illinois.* The announcement of the Lane Technical School, Chicago, for 1916, contains the following statement:

> The Lane Technical School in answer to the insistent demand that the public schools give more adequate preparation for making a living as well as a life, has broadened the character and scope of its work to include the following departments which may in many respects be considered separate schools:
>
> Four-year technical
> Two-year technical
> Prevocational
> Junior college
> Plumber apprentice
> Summer school
> Evening school
>
> Its main department, of course, is the regular *four-year* high school with its *technical courses* preparing for direct entrance to industry and for entrance to technical colleges. But in consideration of the large number who drop out of school prematurely, two-year machine, electrical, mechanical drawing, carpentering, pattern-making, and printing vocational courses have been introduced. These save for the schools and for skilled labor or the professions hundreds annually who otherwise would drop out upon graduation from the eighth grade. Elementary school graduates are admitted without examination and by special permission of the superintendent of schools, applicants from parochial and other private schools. Students may enter at the beginning of either semester in September and February, and at other times if they submit evidence of satisfactory preparation.

Vocational Classes—Growth

Large increases have been made during the last five or six years in the number of public and private schools engaged in work somewhat similar to that usually carried on by technical high schools. In Figure 22 a comparison is made be-

tween the growth of the public high schools and the increase in the number of secondary students enrolled in technical and manual training courses, exclusive of those offered by special

A

Growth of Public High Schools

Date	Schools	Students	Per Cent of Increase	
			Schools	Students
1910–11	10,234	984,677	....	....
1911–12	11,224	1,105,360	9.7	22.4
1912–13	11,277	1,134,771	.5	2.6
1913–14	11,515	1,218,804	2.1	7.5
1914–15	11,674	1,328,984	1.4	9.1
1915–16	12,003	1,456,061	2.8	9.5

Total increase in five years:

Students.................. 48.0%
Schools.................... 17.3%

B

Students in Technical or Manual Training Courses

Date	Schools	Boys		Girls	Total	Per Cent of Increase	
		No.	Per Cent			Students	Schools
1910–11	687	52,030	78.5	14,480	66,510	.....	.....
1911–12	1,060	66,488	80.6	15,721	82,209	23.4	54.3
1912–13	1,173	68,356	88.0	9,379	77,735	.....	10.6
1913–14	1,312	73,640	91.0	7,200	80,840	.....	11.8
1914–15	2,809	132,335	95.0	7,396	139,731	73.0	114.0
1915–16	2,442	120,795	96.0	5,012	125,807	.....	.....

Total increase in four years (1911 to 1915):

Students................ 112%
Schools.................. 328%

Figure 22. Statistics Comparing the Growth of Public High Schools with the Increase in Technical and Manual Training Courses

Based on the Reports of the Commissioner of Education.

industrial and manual training schools. Although the returns received by the Bureau of Education for certain years are obviously incomplete, it is plain that the growth of technical and manual training instruction for pupils of high school age has far outrun the increase in the high school population as a whole.

One of the interesting tendencies brought to light is the marked decrease in the proportion of girls entering such courses. A partial explanation for this falling off in the number of girls enrolled is given in Figure 23, which shows the rapid growth in the number enrolled in commercial and

	1910–1911		1915–1916	
	Commercial Courses	Domestic Economy	Commercial Courses	Domestic Economy
Schools	1,752	591	2,844	3,161
Girls enrolled	59,322	32,569	138,043	137,002

Figure 23. Table Showing Number of Girls Enrolled in Public High Schools

domestic arts courses as given in the Report of the Commission of Education for 1911 and 1916. In many communities agricultural courses were being rapidly developed during this period, thus tending to diminish the number of boys studying manual and technical subjects.

Industrial training courses offered in public high schools are considered in Figure 24. No statistics are available upon which a satisfactory comparison between the growth of this work and that considered in Figure 23 (covering enrolment of girls only) can be based, because the United States Bureau of Education has not reported both sets of figures for the same period of years.

Date	Schools	Boys	Girls	Total Students
1908–09	265	16,444	9,211	25,655
1912–13	1,167	43,821	6,632	50,453
Per cent of increase	340%	166%	......	96%

Figure 24. Statistics of Manual and Technical Training Courses in Public High Schools (Exclusive of Public Manual Training and Technical Schools)

With the exception of the Report of the Commissioner of Education for 1913, no separate data are given for technical or manual training high schools. The table (Figure 26) is compiled from the lists in the commissioner's reports of

Year	No. of Schools	Pupils Enrolled for Manual Arts Instruction			Total Pupils		
		Male	Female	Total	Male	Female	Total
1908–09	36	20,385	7,597	27,982	......	......	......
1912–13	45	23,801	10,561	34,362	26,969	13,406	40,375
Per cent of increase	25%	16.3%	39.1%	22.9%	......	......	......

Figure 25. Table Showing Growth of Manual Training and Technical Secondary Schools

Reports of the Commissioner of Education, 1909, page 1175; 1913, page 532.
NOTE: The Report of the Commissioner for 1913 lists 51 schools under this head, 5 of which are evening high schools. The Ohio Soldiers' and Sailors' Orphans' Home School was omitted since it appears to be a special type institution.

manual and industrial training schools, both public and private, and is not an exhaustive statement of the extent of such schools. Quite the opposite tendency with respect to the enrolment of girls is shown here from that which appears in the enrolment of technical and manual training courses in the regular public high schools. This is no doubt due to the fact that three of the schools listed are girls' technical high schools while several of the others have well-equipped departments giving domestic science courses.

Schools Reporting in 1908-09

Location	Name of Institution
Baltimore	Baltimore Polytechnic Institute (boys)
Boston	Girls' High School of Practical Arts (girls)
Boston	Mechanic Arts High School (boys)
Buffalo	Technical High School (boys)
Chicago	Albert G. Lane Technical High School (boys)
Chicago	Richard T. Crane Technical High School (boys)
Cleveland	Cleveland Technical High School (co-educ.) (East Technical High School)
Harrisburg	Harrisburg Technical High School (boys)
Los Angeles	Los Angeles Polytechnic High School (co-educ.)
Montevallo	Alabama Girls' Industrial School (girls) (Alabama Girls' Tech. Inst.)
Newark	Newark Technical School (boys)
New York	Stuyvesant High School (boys)
Providence	Technical high School (co-educ.)
San Francisco	Polytechnic High School (co-educ.)
San Luis Obispo	California Polytechnic School (state school for boys, largely agricultural)
Scranton	Technical High School (co-educ.)
Springfield	Technical High School (co-educ.)

Additional Schools Listed in the Report for 1912-13

Atlanta	Technological High School (boys)
Cambridge	Rindge Technical School (boys)
Chicago	Lucy L. Flower Technical High School (girls)
Denver	Longfellow Technical High School (co-educ.)
Newtonville	Newton Technical High School (co-educ.)
Venice	Polytechnic High School (co-educ.)

Summary

Boys' schools	11
Girls' schools	3
Co-educational schools	9
Total	23
Manual training and mechanic arts high schools listed in 1912-13 (non-technical schools)	19

Figure 26. List of Public Technical High Schools Appearing in the Reports of the Commissioner of Education

Vocational Schools—Growth

The schools represented in Figure 25 are listed in Figure 26. Of the 16 schools reported in 1909, 1 was for girls only, 6 were co-educational, and 9 were for boys only. One girls' school, 3 co-educational schools, and 2 boys' schools were established during the next four years.

Name of Course	No. of Schools Offering Course	Maximum Number of Years Course is Offered						Years in which Course is Offered			
		Less than ½ yr.	½ yr.	1 yr.	2 yrs.	3 yrs.	4 yrs.	I	II	III	IV
Algebra (College Prep.)	7	..	3	2	2	..	..	2	1	3	4
American History	15	..	12	3	..	..	..	..	1	2	12
Ancient History (Ancient world, Greece, Rome)	7	..	1	6	..	..	..	3	3	2	..
Biology	3	..	..	3	..	..	..	..	2	..	1
Botany	2	..	..	2	..	..	..	..	1	1	2
Chemistry	15	..	..	13	2	..	..	..	4	7	6
Civics	10	..	10	..	..	..	..	..	..	1	9
Commercial or Indust. Geog.	6	..	2	4	..	..	..	4	..	3	..
Community Civics	5	..	3	2	..	..	..	3	..	1	1
Economics	1	..	..	1	..	..	..	..	..	..	1
Economics and Civics	4	..	3	1	..	..	..	..	..	..	4
English	15	..	..	..	..	3	12	15	15	15	12
Business English	2	..	1	1	..	..	..	2	..	..	..
English History	5	..	2	3	..	..	..	..	..	4	1
French	10	..	..	..	4	5	1	5	7	8	8
General Science	9	..	..	8	1	..	..	7	4	..	..
German	11	..	..	..	5	5	1	5	7	9	8
Greek	1	..	..	1	..	..	..	..	1	..	..
Gynasium	7	..	..	1	2	2	2	7	6	4	2
History of Architecture	1	..	..	1	..	..	..	..	..	1	..
Hygiene	2	..	1	1	..	..	..	..	..	1	1
Ind. & Com. Hist. (U. S. & local)	9	..	4	4	1	..	..	2	3	5	1
Ind. & Com. World History	1	..	1	..	..	..	..	..	..	1	..
Latin	5	..	..	..	1	1	3	5	5	4	3
Mathematics (not defined)	4	..	..	..	3	..	1	4	4	2	2
Med. & Modern History	2	..	..	2	..	..	..	..	2	..	..
Mediæval History only	2	..	1	1	..	..	..	..	1	1	..
Mod. European Hist. only	2	..	..	2	..	..	..	..	1	1	..
Music	4	..	1	1	1	..	1	3	2	3	1
Oral English	1	..	..	1	..	..	..	..	1	..	..
Physical Geography	3	1	1	1	..	..	..	3	..	..	..
Physics	12	..	..	11	1	..	..	1	2	11	2
Plane Geometry	10	..	..	10	..	..	..	..	9	2	..
Public Speaking	1	..	..	..	..	..	1	1	1	1	1
Review Mathematics or Advanced Mathematics	5	..	..	4	..	..	1	1	1	1	5
Solid Geometry	8	..	6	2	..	..	..	..	..	8	1
Spanish	6	..	..	1	1	3	1	4	5	4	4
Trigonometry	7	..	7	..	..	..	..	..	..	3	6

Figure 27. Table Showing Academic and General Subjects Studied by Boys Only, in 15 Technical High Schools

Name of Course	No. of Schools Offering Course	Maximum Number of Years Course is Offered							Years in which Course is Offered			
		Less than ½ yr.	½ yr.	1 yr.	1½ yrs.	2 yrs.	3 yrs.	4 yrs.	I	II	III	IV
Algebra I (not College Preparatory)	8	1	1	5	..	1	..	..	7	1	1	..
Applied Science	1	..	..	..	..	..	..	1	1	1	1	1
Architectural Drawing	8	..	1	4	2	..	1	..	..	2	4	7
Drawing (not defined)	3	..	1	1	..	..	1	..	2	1	2	1
Electrical Theory	2	..	..	2	..	..	..	..	..	..	1	1
Elementary Representation and Design (Sketching)	4	..	1	2	..	1	..	..	1	1	1	3
Electricity (includes Electrical Construction)	7	..	..	5	2	..	..	..	1	1	1	6
Free-hand Drawing	5	..	1	1	..	1	2	..	3	3	4	2
Mechanical Drawing	15	..	1	..	1	7	2	4	10	9	11	8
Mechanics	1	..	..	1	..	..	..	..	..	..	..	1
Reading, Drawings, Sketching	2	..	2	..	..	..	..	..	1	..	..	1
Shop Mathematics	7	1	3	2	..	1	..	..	2	2	3	3
Structural Drafting and Design	3	..	..	2	..	1	..	..	..	2	1	2

Figure 28. Statistics of Applied Science, Practical Mathematics, and Drawing Courses Offered for Boys Only, in 15 Technical High Schools

Name of Course	No. of Schools Offering Course	Maximum Number of Years Course is Offered							Years in which Course is Offered			
		Less than ½ yr.	½ yr.	1 yr.	1½ yrs.	2 yrs.	3 yrs.	4 yrs.	I	II	III	IV
Accounting (Bookkeeping)	6	..	2	1	..	2	1	..	2	2	4	1
Business Law (Commercial Law)	4	..	3	1	..	..	..	..	..	..	..	4
Business or Office Practice	2	..	1	1	..	..	..	..	..	..	..	2
Commercial Arithmetic	7	2	2	3	..	..	..	..	5	1	1	..
Indexing	1	..	1	..	..	..	..	..	1	..	..	..
Penmanship	3	1	..	1	..	1	..	..	2	1	..	..
Spelling	4	2	..	1	..	1	..	..	3	1	..	..
Stenography (Shorthand)	5	..	..	1	..	4	..	..	..	..	4	4
Typewriting	5	..	..	1	..	3	1	..	..	1	5	5

Figure 29. Statistics of Commercial Subjects Offered for Boys Only, in 15 Technical High Schools

Courses of Study

The material presented in this section has been gathered from an examination of the printed courses of study in use by the technical high schools in 1916 and 1917. This study has been supplemented in several cases by correspondence and by personal visits to the schools in question. In Figures 27 to 30 inclusive are shown the subjects studied by boys only

Name of Course	No. of Schools Offering Course	Maximum Number of Years Course is Offered							Years in which Course is Offered			
		Less than ½ yr.	½ yr.	1 yr.	1½ yrs.	2 yrs.	3 yrs.	4 yrs.	I	II	III	IV
Agriculture	3	..	..	1	..	1	..	1	1	1	3	2
Art Metal-work	3	..	1	1	..	1	..	..	..	1	2	1
Blacksmithing (Forge)	12	1	8	3	..	..	..	..	2	7	4	1
Cabinet-making or Joinery	15	..	5	6	..	3	1	..	7	7	3	2
Carpentry	4	1	..	..	..	2	1	..	2	3	2	..
Carving	1	..	..	1	..	..	..	..	..	1	..	..
Cement and Concrete	1	..	1	..	..	..	..	..	..	1	..	..
Foundry	7	1	4	2	..	..	..	..	1	7	1	1
Machine Construction and Tool-making	1	..	..	1	..	..	..	..	..	..	..	1
Machine-Shop	15	..	1	3	1	5	3	2	4	7	12	15

Figure 30. Statistics of Shop Courses and Field Work Offered for Boys Only, in 15 Technical High Schools

in the following schools: Mechanic Arts High School, Boston; Central High School, Harrisburg, Pennsylvania; Providence Technical High School; Central High School, Minneapolis; Technical High School, Buffalo; the Newton Technical High School, Newton, Massachusetts; Cass Technical High School, Detroit; Technical High School, Fall River, Massachusetts; the Lane Technical High School, Chicago; Technical High School Springfield, Massachusetts; West Technical High School, Cleveland; Technical High School, Atlanta, Georgia; Stuyvesant High School, New York; Technical High School, Scranton, Pennsylvania; Polytechnic High School, Riverside, California.

	Boys, Girls, or Co-ed.	College Preparatory		Commercial		Agriculture	Domestic Economy	Manual Training (Shop-Scientific)	Part-time Vocational (or day continuation) Classes	Short-Unit Courses (Trade Training)	Fine Arts, Applied Design, and Photo-Engraving	Normal School, Preparatory only	Two-Year General Vocational Courses for Boys	Highly Specialized Vocational Courses
		Classical	Technical and Scientific	Clerical and Stenog.	Business or Salesmanship									
Tech. High, Harrisburg, Pa.	B	x	x	...	...	...	...	x	...	...	...	...	...	...
Tech. High, Providence, R. I.	C	...	x	...	(8)	...	x	x	x	...	...	...	...	...
Tech. High, Fall River, Mass.	C	...	x	x	x	...	x	x	...	...	x	...	...	...
Arsenal Tech. High Indianapolis, Ind.	C	x	x	x	x	x	x	x	x	x	...	...	...	x
Mechanic Arts High, Boston, Mass.	B	...	...	...	...	...	...	x	...	...	...	...	...	...
Newton Tech. High, Newton, Mass.	C	...	...	x	x	...	(3)	(3)	...	...	x	x	(3)	...
West Tech. High, Cleveland, Ohio	C	...	x	...	...	...	x	x	...	...	x	...	...	...
Cass Tech. High, Detroit, Mich.	B	...	x	(3)	(3)	...	...	x	x	...	...	x(4)	...	x
Tech. High, Springfield, Mass.	C	x	x	x	...	...	x	x	...	...	x	...	...	...
Lane Tech. High, Chicago, Ill.[1]	B	...	x	...	...	...	...	x	x	x	...	...	x	x
East Tech. High. Cleveland, Ohio	C	...	x	...	...	x	x	x	...	...	x	...	...	...
Riverside Polytechnic High, Riverside, Cal.	B	x	x	x	x	x	...	x	...	...	...	...	...	...
High School of Practical Art, Boston, Mass.	G	...	...	x	x	...	x	...	...	...	x	x	...	(5)
Lucy Flower Tech. High, Chicago, Ill.	G	...	x	...	...	...	x	...	...	x(6)	x	...	...	(7)
Stuyvesant High School, New York City	B	...	x	...	...	...	...	x	x	...	...	...	...	x
Rindge Tech. School, Cambridge, Mass.	B	...	x	...	x	...	...	x	...	...	x	...	...	x
Los Angeles Polytechnic High School, Cal.[2]	C	...	x	...	...	...	x	x	...	...	x	...	...	x
Tech. High School, Buffalo, N. Y.	C	...	x	...	...	...	...	x	...	...	x	...	...	x

1 Work of a somewhat similar character is done in the Carter H. Harrison and Crane Technical schools, Chicago.
2 Also offers courses in music, journalism, architecture, and special preparatory courses in electrical mining and civil engineering.
3 Offered in another school in the same building.
4 True of commercial subjects.
5 Specialized courses are offered in salesmanship, art, dressmaking, and millinery; not strictly trade training.
6 Five months' course in stenography and typewriting for high school graduates.
7 Girls major in cooking, sewing, and art. Practical courses are given in the last two years.
8 Boys only. No stenography or typewriting.

Figure 31. Table Showing Courses of Study Offered by 18 Technical High Schools

No similar tabulation was made of the subjects offered for girls in practical arts high schools nor in co-educational technical high schools. This omission was made because only a few girls' technical high schools are in existence and their courses are not as yet well standardized. Moreover, in the co-educational technical high schools the courses attended by girls have not differed to any great extent from the work offered in the usual general high school course. In neither case has any marked contribution yet been made toward the preparation of women for industrial pursuits.

Figure 31 shows the courses of study offered by 18 technical high schools in 1916 and 1917. In making the tabulation for the four preceding tables the normal school courses for boys listed in Figure 31, have been omitted.

Facts Revealed by Tables

Three important points are brought out by these tables:

1. That many of these high schools give opportunities for college preparatory work equivalent to that found in general or classical high schools.
2. That comparatively little has yet been accomplished by way of adapting the resources of the school to meet the actual needs of the community.
3. The aims of both manual training and technical high schools are uncertain and their work is not being developed in co-operation with commercial and industrial leaders.

Aside from applied mathematics and science, little is factory that is of immediate value to most industries. With one or two possible exceptions, shopwork is far removed from offered processes or the demands of commercial establishments.

CHAPTER VII

DEVELOPING THE POSSIBILITIES OF THE SCHOOLS

Recent Tendencies

During the period of the war many of the technical high schools utilized their shops for training soldiers or turning out war materials. With the cessation of these activities attention has been turned to the development of practical courses which would come within the limits set by the Smith-Hughes Law. The Lane Technical High School of Chicago, for example, now offers the following Smith-Hughes courses:

Architecture	4 years
Machine-shop practice	2 "
Architectural drawing	2 "
Agriculture	2 "

This school has also introduced short-unit courses for bakers and for plumbers' apprentices, and conducts evening school classes for young men and women engaged in commercial work and in industries.

A few schools have carried their courses into the field of training for minor executives or foremen. Thus Cass Technical High School in Detroit has planned classes which may be held either in the school or in the shop for the preparation of foremen employed by the local industries. It is not probable that many high schools now have among their instructors men who are qualified to direct this kind of training. For the present, it would seem wiser for them to limit the scope

of their work to that intended to assist younger persons and less important executives.

The variety of work which may be attempted by a high school which sets out to meet the needs of the local community is suggested by the following partial list of course offered at the Stuyvesant High School in New York City in 1918:

- Qualitative and quantitative analysis
- Topographical drawing
- Power-plant drafting
- Machine design
- Ship design and construction
- Instrument making
- Milling and building construction
- Surveying
- Water analysis (applied biology)

For a further consideration of the work done in various cities, the reader is referred to Appendix A.

Distribution of Technical High Schools

The technical high schools established prior to 1914 were found for the most part in the larger cities where diversified industries made a large demand upon the schools for trained leaders. The 23 schools listed in Figure 26 (page 98) were distributed as follows:

In cities of 450,000 population or over	11
In cities of 100,000 or over	7
In cities of less than 100,000 population	5
Total	23

Of the schools in cities under 100,000, one is a state school, largely devoted to agriculture, and the work done by at least two of the others does not differ materially from that done in the usual composite or general high school.

There seems to be little justification for the erection of separate manual training or technical high schools in cities with a population less than 100,000. It should be added, however, that far less cause exists for the maintenance of separate classical high schools in such cities.

Special Type School: Disadvantages

Some of the arguments against the special type school are suggested in the conclusions drawn from the surveys. Several complete discussions of this question have been published[1] which set forth in much greater detail than can be attempted here the social and economic disadvantages of the special type system. The problems arising out of the needs for dealing with large numbers of students and the difficulty of finding the type of administrator who will fully sympathize with the varied interests of a composite school, may make it advisable in some of the larger cities to establish a few special type high schools. Where the population of the city is scattered over a considerable area, much of which is without adequate transportation facilities, as is the case in San Francisco, it seems to be much more advantageous for each school to give a general course, and at the same time specialize in a given field, such as college preparatory, industrial, technical, or commercial. The chief advantage of this plan lies in the fact that pupils who choose a course poorly adapted to their needs or abilities can be more readily placed in congenial work.

In any event, the high schools of a city should be administered as a unit with the thought of adapting their work to meet the social and economic demands of the community as a whole. In planning courses of study, in offering vocational guidance, and in transferring pupils from one department to another, the ideal of promoting an adequate, well-integrated educational scheme should be kept to the fore.

[1] For example, Inglis, A. J., "The Principles of Secondary Education."

Prevocational Education

The junior high school helps to answer several questions which arise in the effort to define the aims of a secondary technical school. The need is eliminated for giving a year of work which is nearly alike in all the courses, a practice which appears to be frequently followed in four-year high schools. The junior high school graduate ought to be ready to enter at once upon more highly specialized instruction than is now attempted in the third or fourth year of some high schools because he has already had much of the prevocational experience which was given heretofore in the high school.

The strong academic trend apparent in the teaching of so many of the schools under consideration no doubt arises largely from a desire to provide in advance for third- and fourth-year students who discover late in their course that they wish to continue their education in a higher institution. Subject matter and method are determined too much with a view to satisfying college entrance requirements, and too little from practical economic considerations. The fault no doubt arises in part from a mistaken conception held by many teachers of mechanical drawing and shop subjects as to the real nature and purpose of their work. They have sought to claim for their subjects the same advantages which tradition ascribes to languages, science, and mathematics. Their work has been planned with a view to developing abstract powers of accuracy, reasoning, and critical discrimination.

Manual Training Aims in the High School

A few leaders have maintained that the manual training and technical high schools should abandon the effort to prepare for college and concentrate their attention upon the training of "non-commissioned officers for industry." [2] Although

[2] A discussion of this question by Arthur L. Williston appears in the "Proceedings of the National Education Association," 1914, page 577.

they may quite justly claim that the real work of these schools has suffered through their effort to meet college entrance and regents examinations, this does not need to be true. Such an institution as the Manual Arts High School of Los Angeles, with its extensive plant and varied activities, not only gives a far more effective kind of preparation for college than the usual classical high school, but offers in addition technical instruction of a kind that is superior to that provided by many of the special type schools. The trouble has been not so much with the requirements of the colleges as it has with the teachers and principals of the secondary schools, whose thinking has been dominated by the necessity for formal logical steps, systematic exercises, and an outworn theory of mental development.

The place of the manual training high school in the general educational scheme has shifted considerably since these schools were first organized. At present there appears to be no justification for a type of school in any city whose vague purpose is "to give boys and girls a general cultural education, and at the same time develop their mental and physical activities by acquainting them with materials, tools, and processes." There seem to be two courses open to manual training and technical high schools of this character. They may follow the example of the George Weitbrecht Mechanic Arts High School in St. Paul and become general high schools, or they can reorganize and intensify their work to meet the real demands of the community as the East Technical High School in Cleveland is endeavoring to do.

Training for Junior Industrial Leaders

One of the claims most frequently made by technical secondary schools is that they prepare young men and women for subordinate managerial and executive positions or for positions as assistants to technical specialists. There is un-

questionably a considerable demand in industry for persons with less training than is given by the engineering colleges but with a better grasp of theoretical principles and a broader outlook than the trade school usually develops. Figure 32 gives some statistics for the city of Minneapolis[3] which are

Occupation	Male	Female	Total
Foreman and overseers of manufacturing and mechanical industries	852	128	980
Electrical engineers	817	2	819
Mechanical engineers	110	...	110
Managers and superintendents	739	11	750
Inspectors, gaugers, and samplers	133	12	145
Sales agents	140	15	155
Foremen and overseers of railway transportation	289	...	289
Foremen and overseers of road and street transportation	66	....	66
Foremen, telegraph and telephone companies	36	9	45
Civil engineers and surveyors	296	....	296
Mining engineers	33	....	33
Designers	34	....	34
Draftsmen	257	4	261
Foremen and overseers—lumber	20	....	20
Foremen, overseers, and inspectors—mining	9	....	9
Total	3,831	181	4,012

Figure 32. Table of "Non-Commissioned Officers" of Industry in Minneapolis

These figures compiled from the United States Census of 1910, Vol. IV, show only approximately the number of such persons.

suggestive of the number of persons who may be expected to enter such employment. On the basis of 143,482 wage-earners in Minneapolis in 1910, the positions listed in this table represent about 2.8 per cent of the total number employed.

The survey report draws the following conclusions from

[3] Vocational Education Survey of Minneapolis, Minn. See Appendix page 356.

its study. It should be pointed out that these are only general statements based upon a somewhat superficial study made some years ago.

1. It is estimated that the salaries of these persons fall for the most part between $75 and $200 per month, 95 per cent receiving from $75 to $150 and the remainder from $150 to $200.
2. These positions were gained:
    (a) By chance promotion after long service in firms where little attention is given to selecting men or to mapping out lines of promotion.
    (b) By personal study and analysis of the tasks ahead of them on the part of persons who were determined to succeed.
    (c) By starting at the bottom and preparing for promotion through evening classes or correspondence courses.
    (d) By transfer to business, directive, or technical posts of men who had served a brief apprenticeship after thorough preparation in colleges or technical institutions.
    (e) By graduates of the high school manual training course who knew how to read blue-prints and who had an elementary knowledge of tools, materials, and processes.

This report appears to underestimate considerably the number of persons who require technical training for positions of this kind. There are a number of important classifications entirely omitted, such as chemists, foremen, and department heads in the wholesale and retail trade, women employed as executive secretaries and as supervisors and executives in a variety of small establishments, and persons in the public service.

Technical Training and Shipbuilding

The relative number of persons with training equivalent to that offered in a four-year secondary technical school, who

Department	Total Number Employed in These Departments	Number of Persons Needing Technical Training	Approximate Per Cent Needing Technical Training
Anglesmiths, blacksmiths, drop forging, and die-sinking	356	20	6
Boiler-shop	255	25	10
Copper-shop	100	13	13
Electrical shop	279	147	53
Erecting rades[1]	3 161	128	4
Fitters	492	162	33
Foundry	252	50	20
Joiner-shop	263	26	10
Machine-shop	1,163	166	15
Mold loft	123	39	32
Naval architecture (all drafting work)	240	200[3]	83
Outside machinists	405	91	23
Paintshop	379	20	5
Pattern-shop	93	57	61
Pipeshop and plumbing[2]	575	105	18
Sheet-me al shop	177	49	28
Ship carpenters	473	36	8
Steelmill	716	43	6
Yard riggers and laborers	1,049	41	4
Total	10,551	1,418	13

[1] Includes chipping, calking, bolting, drilling, reaming, riveting, erecting, and testing.
[2] Includes machinists who install turrets, ordnance handling machinery, etc.
[3] No exact data available. Probably nearly all of these persons should have technical training.

Figure 33. Table Showing Percentage of Minor Executives and Other Persons Needing Technical Training in the Leading Trades in the Shipbuilding Industry

Based on totals for two yards building steel ships.

are needed in the shipbuilding industry, is roughly estimated in Figure 33. A shipyard building steel ships includes a wide range of manufacturing and construction work in both metals

and wood. Outside of the actual ship construction, men are employed in from eighteen to twenty shops and mills, such as the steelmill, the pattern-shop, the machine-shop, the foundry, the sheet-metal shop, and the mold loft. In the group regarded as needing technical training were included foremen, assistant foremen, gang leaders, estimators, rate-setters and time-study men, special draftsmen and clerks in shop offices, and men engaged in highly skilled work requiring either long experience, or technical training and a short period of apprenticeship. This estimate does not include many men engaged on skilled or semiskilled work whose production and general efficiency would be greatly increased by two to four years of technical preparation.

These figures seem to show the need in the shipbuilding industry for a considerable number of employees with more training than is ordinarily offered in the trade school and less than that expected of marine architects or engineers. Plans for vocational guidance as well as technical education should be based upon more complete investigations, somewhat along the lines indicated above, which would show the number of such positions as well as the kind of preparation required for them.

Co-operation of Public and Industry

As pointed out in Chapter I, there is no good reason why industrial concerns should set up educational departments for teaching mathematics, applied science, economics, or drawing. These are all parts of an education of general value to an employee in almost any industry; the burden ought to be borne by the community and not by a few industries that have the vision to see that education pays. Our technical high schools are the logical center for such work and will undoubtedly come in time to accept a large part of it. The Lane Technical High School in Chicago has made a small beginning

by offering special courses for bakers' and plumbers' apprentices. What is urgently needed is a rapid extension to industrial fields of the kind of work which has so long occupied our attention for a few trades such as wood-working, electricity, and machine-shop practice. It may very well be that the bulk of this must be done in the factory, but certainly no serious beginning will be made until both schoolmen and industrial executives face the issue and endeavor to come together to work out a program.

Special Training for Leadership

Educators in technical institutions have usually mapped out their courses of study and planned their teaching with a view to the technical factors involved in production. The subjects taught and the methods of instruction are all adapted to increase the workman's skill or his understanding of the principles involved in dealing with machinery, materials, and processes. Schools as well as business concerns have given very little thought to the kind of men who should be selected as gang leaders and foremen or to preparing them to meet the technical details of leadership.

In advocating his plan of functional foremanship, Taylor tried to avoid some of the evils which arose from placing a great variety of tasks in the hands of men who were not prepared to meet them. It requires little imagination to picture the mental perplexity of many a foreman promoted from a relatively simple day's routine to face a confusing array of duties—inspection of product and machinery, arranging for new equipment or repairs, caring for raw materials, fixing costs, altering rates, keeping production records, training new recruits, disciplining offenders, selecting and rating employees, meeting the constantly varying demands that come with a growing department and increased production. By organizing a special department of industrial relations or employment

management, the foremen are relieved of part of the responsibility for the selection, education, discharge, and promotion of employees. Even after responsibility for these matters has been assumed by a special department, the foreman, department head, or group leader must still recognize a variety of personnel factors in his management if he is to succeed in doing his part in building up a stable and harmonious organization. Much of this success lies with the temperament of the person, but a great deal can be acquired through training.

Possibilities of the Technical High School

Although the training of both employment managers and foremen must be accomplished for the most part in higher institutions, and through part-time courses for adults, there is a well-defined field of preparation for personnel management of a simpler kind which may well be attempted by the secondary technical school. It ought to be quite possible to set any of the students in part-time or evening classes and many of the boys in the regular third- or fourth-year classes to thinking seriously about general labor problems and especially about appropriate methods of dealing with employees. The elementary principles involved in wage-setting, scientific management, and plant sanitation, the history and aims of organized labor, hours of labor and fatigue, accident prevention, occupational disease, and the labor costs of operation are among the numerous topics which may profitably receive attention. Advanced pupils may very well consider some of the problems involved in participation in management through committees of employees, advisory councils, employees' associations, or foremen's meetings.

Courses in Management

Many secondary schools could profitably undertake the adaptation of certain of their courses to meet the needs of

managers and executives in smaller business houses and manufacturing concerns. An instructive article by Stanley A. Dennis, "When Will My Business Die," appeared in *System*, October, 1917. An investigator for *System's* Bureau of Standards studied the financial histories of 2,550 retail concerns, 1,327 factories, and 492 wholesale houses in a typical American city. During a period of 30 years, 62 per cent of the manufacturers, 58.6 per cent of the retailers, and 51 per cent of the wholesalers failed or went out of business.

Dun's Review for 1917 reports 3,691 failures among manufacturing firms with liabilities of $79,543,000. Failures among commercial houses in the same year according to the Statistical Abstract of the United States, totaled 13,855 with liabilities of $1,733,225.

Causes of Failure

Analysis of the causes of these business failures shows that a large proportion of them are due to the inability of executives to apply some of the elementary principles of organization and management. A great majority of the men who are responsible executives in small firms today have had less than a high school education. Even those who have been trained in the secondary schools have not as a rule become acquainted with any of the practical fundamental principles of economics or the basic methods of business management. The emphasis in commercial courses has been upon clerical training and not at all upon the technical aspects of organizing and controlling the commercial or industrial enterprise.

The Present Opportunity

In the field of part-time and continuation education, work of this kind offers a splendid opportunity, and certain aspects of it may well be developed in regular high school courses. Every large industrial establishment offers numerous oppor-

tunities for the boy with a certain type of practical business training; the toolroom, the stockroom, receiving and shipping departments, shop offices, time-keeping, rate-setting, and time study are only a few of numerous opportunities. For all of them, the boy needs a very different kind of instruction from what the usual type of commercial school offers. If the high school is to become a real factor in industrial education, teachers and department heads must gain a fresh insight into local needs. Courses such as those for minor executives outlined in Chapter XI can doubtless be organized by competent high school instructors and given either in the school building or in the plant. The essential practicality of the instruction need not suffer, and if it is properly planned, a considerable content can be included which is often to be omitted where intensive work is done wholly at the company's expense.

Present Handicaps

Two types of secondary schools, as has been noted, have tried to adapt their courses to industrial needs, the technical high school and the cosmopolitan or general high school. The work so far attempted has been compromised by powerful academic traditions. Much of it even today is manual training of doubtful value either as cultural or vocational education. Radical changes in the character of the teaching and supervisory staff must occur if the high school is to become a community center for the education, vocational guidance, and training of minors employed in industry.

Still more changes are necessary if the schools are to serve effectively the older employees. A more general appreciation of the possibilities of the schools is much to be desired. It needs to be understood that the old purposes are not adequate today. It is to be hoped that an enlightened public will be more insistent on having all the schools organized and directed to meet the needs of a new age.

CHAPTER VIII

RELATION OF EMPLOYMENT MANAGEMENT TO INDUSTRIAL TRAINING

Employment Management—A New Profession

Few social or industrial developments can parallel the employment management movement in extent and rapidity of growth. Aside from sporadic attempts to interest employers in "welfare" activities, very little attention had been given to organized personnel work previous to 1912. In that year, the Boston Employment Managers' Association was formed, the first meetings being held at the invitation of the Vocation Bureau of Boston. Less than a half-dozen of the charter members of the association could call themselves employment managers in the sense in which the term is now used; the remainder were superintendents, managers, teachers, and others who were interested in labor matters. At that time there were probably less than a dozen concerns in the United States having functionalized industrial relations departments. In Europe the movement was then unknown and even now has made little progress; the same is true of Canada.

There are now[1] thirty-three local employment managers' associations in various parts of the United States and a strong national association. There are two government departments with special staffs engaged in the study of employment management methods, and special courses for training employment managers have been permanently established in several universities. The leading technical and trade journals are

[1] May, 1919. The national organization is now known as the Industrial Relations Association of America.

devoting attention to various phases of the field and there is a rapidly growing list of books and pamphlets worthy of being called scientific contributions to a new profession.

Evolution of Employment Management

Historically, the employment department may be regarded as an outgrowth of several significant modern movements, some of them of general public interest and others confined more strictly to industrial management. Among them are the general drift in administration toward staff departments or functional management, the evolution of cost accounting, campaigns for safety, sanitation, and hygiene, the vocational guidance movement, the enactment of factory legislation and labor laws, and general progress in applied psychology, sociology, and medical science. Perhaps the movement having the most obvious connection with employment management is the tendency toward functionalized management. Successful industrial experience has made clear the need for a general manager whose principal duties consist in translating the aims and policies of the concern into action and in correlating or harmonizing the work of the several departments into which the organization is divided. To accomplish this, the general manager must have the assistance of specialists who concentrate upon a limited field, acquiring the specific information upon which decisions are based and plans are executed. Recent experience has demonstrated that the functions which center in the service department are fully as important and can be as clearly defined as those which have already been segregated under the cost accountant, the sales manager, or the superintendent of production.

Relieving the Foreman

Functionalized personnel management relieves the foreman quite as much as the general manager. Most manufacturers

have already taken from the foreman supervision over the development of experimental work, the purchase of raw materials and new equipment, the computation of costs, and even the planning and routing of production. If the foreman cannot be expected to specialize in any of these activities, much less can he effectively discharge the time-consuming and highly technical duties related to the selection, promotion, training, discharge, and welfare of employees. Professor Edward D. Jones has thus summarized the advantages of centralized employment control over the older "foremanizing" methods:

> In this way the general shop foreman is relieved of hiring friends of employees in his own department who importune him for selected jobs merely on the basis of friendship and not fitness. He is no longer a "bouncer." He no longer can sell jobs, or hold his pets in soft assignments. He has not the easy device of covering his own incompetence by firing a man. He can ask for the transfer of unsatisfactory employees, but if enough of these transfers show that discarded persons are able to make good in another shop where the foremanizing is different, he prepares a prima facie case against himself. The foreman gets a more even and dependable run of workmen from the employment department than he can provide for himself. And he is freed from many distractions to become an expert in shop manufacturing processes. The employment manager must find a way to secure the enthusiastic co-operation of the foremen with whom he works, and to enlist their sympathy with the policies of the management, and of his own department, as if those policies were their own.

Service Department—Self-Supporting

A service department rightly managed does not mean an increased burden upon the cost of doing business. On the contrary, the service manager ought to be constantly on the alert to discover and eliminate the needless wastes in produc-

tion costs which are certain to be found in any large organization. The service manager ought to be the labor cost accountant of industry. Cost accounting was formerly confined to simple records of labor, material, and arbitrary overhead charges for general expenses. In recent years it has grown much more searching, and is now being applied to the minute analysis of those factors which increase or diminish the efficiency of labor. No factory manager can afford to neglect a careful study of the costs due to labor turnover, to absenteeism, to tardiness, to accidents, to improperly trained men, and to unskilled persons who have been assigned to tasks for which they are unfitted.

Service Department and Physical Well-Being

Next to the initial selection and the training of the employee, the supervision of his health and safety are of greatest importance. Here again we find evidence of public interest and well-defined industrial movements which have crystallized in the recognition of hygiene, safety, and sanitation as important functions of the service department.

Defect	Number Inspected	Number Defective	Percentage Defective
Clothing, defective	335,796	17,640	5.25
Footgear, defective	335,796	36,003	10.72
Uncleanliness of head	335,796	47,638	14.19
Uncleanliness of body	335,796	20,845	6.21
Malnutrition	333,395	44,176	13.25
Disease of nose and throat	335,812	69,614	20.73
Dental disease	302,409	209,010	69.12
Defective hearing	238,129	26,373	11.08
Defective vision	71,128	12,221	17.30

Figure 34. Statistics on Defects among School Children, Reported by the Local Education Authorities in England for 1915

Annual Report for 1915 of the Chief Medical Officer of the Board of Education, page 27.

Charles W. Eliot, President Emeritus of Harvard University, has pointed out in a recent paper some of the defects in American education together with the remedies for them. Dr. Eliot's observations may be found in Teachers Leaflets No. 5, Bureau of Education, Washington, 1918. He lays particular stress upon our failure, as shown by the results of the examinations for the army draft, to produce young men who are physically fit. The percentage of defective persons discovered among the young men drafted for military and naval service has been "a source of surprise and mortification" to everyone who was not thoroughly acquainted with

Nature of Defect	Number
Decayed, irregular and unclean teeth, pyorrhea and alveolar abscess	76,923
Nose, throat, and mouth defects	28,401
Eye complaints	21,960
Skin diseases	25,313
Anæmia and poor nutrition	3,222
Ear complaints	1,681
Nerve disorders	568

Figure 35. Table Showing Defects Among 62,027 School Children in Philadelphia

"Medical Inspection of Schools and Child Hygiene of Philadelphia." Reprint from Annual Report of the Bureau of Health of the Department of Public Health and Charities for 1916, page 36.

the conditions existing among the children in our public schools. The statistics kept by the few cities which have had some adequate form of medical supervision indicate that the percentage of pupils who are physically defective is very large indeed. Figures 34, 35, and 36 suggest the conditions known to exist in the United States and in England.

It is to the interest of employers of labor to be aware of the means which can be applied to remedy this situation. Rejecting the cases showing major defects and placing to

advantage those who are physically and mentally handicapped solves only a part of the problem. Policies of more far-reaching influence must be adopted. Industries will profit by co-operation with public and private agencies seeking to promote the public health, as well as by installing complete medical departments of their own. Union labor has come to recognize the value to the worker as well as to the em-

Nature of Defect	Percentage
Defective teeth	46.6
Throat trouble	18.4
Enlarged glands	12.9
Defective eyesight	11.7
Nasal trouble	10.6
Defective hearing	1.6
Other defects	8.3
Children having defects	64.3

Figure 36. Table Showing Percentages of Children Having Certain Physical Defects. Based on the Examination of 559,863 Children in 9 Cities in the United States

Adapted from "Medical Inspection of Schools (page 38), by Gulick and Ayres, (1913).

ployer of the initial examination and later medical attention, and has indorsed the physical examination of applicants and other work done by industrial physicians and nurses.

Utilizing the Industrial Physician

To be sure, it will be difficult for some years to come to find men who have the training or the point of view essential to success as industrial physicians. Nevertheless, the employment manager who wishes to train his staff can accomplish a great deal by way of developing an understanding of the physical requirements of the occupations represented in his industry. Through a relatively short period of personal

investigation, physicians and nurses can become acquainted with the conditions prevailing in the factory and with the physical limitations which ought to be borne in mind in placing an employee.

One of the great services which can be rendered by the industrial physician is assistance in placing sailors and soldiers handicapped in the course of the war, and in caring for our industrial cripples. Simple amputation cases really make up only a small percentage of the total number of those who suffer from some form of physical disability, and are as a rule the easiest cases to adjust to satisfactory employment. Much more numerous are the men and women suffering from complex ailments or physical disabilities, and they cannot be safely placed except with the assistance of persons who combine medical training with an intimate knowledge of factory conditions.

Accident Prevention

Through state intervention and by reason of the activities of organized labor, insurance companies, and safety-first organizations, accident prevention has been made a part of the work now being carried on in many establishments. Although much has been accomplished, added interest must be felt in this matter if we really are to serve the interests of the employee.

Management and Labor in Co-operation

The true service manager should be able to bring both management and labor to see the advantages to be gained by protecting the lives and health of workers. He must bring them to realize that provision for cafeterias, better housing, medical attention, the elimination of unnecessary fatigue, the improvement of plant sanitation, and better transportation from and to the place of work are properly included in any

co-operative effort undertaken to increase the general efficiency of the labor force.

Labor Legislation

If we may judge by the experience of the past few years, the next decade will see the enactment of a large body of far from perfect state and federal labor legislation. Mere denunciation of this tendency, or even organized opposition, will be largely fruitless. It will be much better to develop staff assistants in employment departments who through their records and their research studies can provide the data upon which better legislation can be based. The National Employment Managers' Association and the local organizations ought gradually to come to the place where they can exercise a profound influence upon the course of legislative action. No other group of persons will be in a position to see the needs of labor so clearly nor to interpret them so sympathetically.

Employment Management and Social Progress

It is only rarely that a concern without centralized control of employment is able to co-operate effectively with vocational guidance agencies or with other organized efforts to improve social conditions in the community. Still less frequently does such a concern attempt experimental or research work in the province of human relations although both applied psychology and sociology have opened extremely attractive avenues for study and experimentation.

It is the increasing appreciation of the relation of the organized employment department to these new possibilities that accounts for the rapid growth of such departments. The situation in business as in the other affairs of society is becoming increasingly complex. New problems are constantly developing under the conditions of modern industry. Some old questions have become more acute.

The application of scientific principles and methods will do much to hasten the solution of such problems as those of fatigue, the use of non-financial incentives, increased enjoyment of work, the selection, training, and advancement of employees, the adjustment of machines and methods to suit the psychology of the worker. So long as these new movements remain in the experimental stage, however, industry can expect to get little more than suggestions as to points of departure from the scientist or social worker unacquainted with the practical details of manufacture. Substantial advancement is now being achieved and can be hoped for in much larger degree through the efforts of trained men and women who approach these questions from the practical, scientific point of view of staff specialists.

Functions of the Service Manager

Briefly stated, the task of the employment or service manager is to recruit, train, and maintain a stable, efficient working force. In some respects he may be said to practice the profession of human engineering; he prepares specifications and a schedule of labor needs, selects his material with care, adapts it to the demands of his concern, and applies scientific principles in developing and maintaining its efficiency. But there are important points at which the analogy to engineering breaks down. The really efficient employment manager is not engaged in "handling men." He works with men in a co-operative enterprise, helping each party to the undertaking to render the maximum service and derive the greatest possible benefit from the association. In all matters affecting the labor contract or employment conditions, he is the immediate representative of three separate interests—management, labor, and the local community. Indirectly, he must also voice the best interests of capital and the public. Each of these groups he must protect, serve, and interpret to the

others. Wherever employment departments have broken away from the tendency to become mere employment bureaus exercising only selective and clerical functions, and have adopted this wider conception of their place in the community, they may be called properly "service departments."

Lessons from War Emergency

The demands made by increased production under war-emergency conditions necessitated extreme measures in recruiting employees. Realizing the impossibility of meeting the situation through their older methods, most industries readily adopted the suggestion of various government departments—that a director of industrial relations be employed. But too many firms were satisfied with securing employment managers whose sole duty was to recruit labor. While contact with the sources of labor supply and the right selection of employees were essential, it was plain that the employment manager must be given authority to deal with other important matters if conditions were to be improved. The shipyards, as well as many other war industries, finally realized that laying the emphasis entirely upon recruiting led to a tremendous waste of energy. They discovered that their task could be accomplished only by training new employees and by making a systematic effort to hold the men they already had in their organizations. Figures 37 and 38 outline the activities of a service department developed with these aims in view. They enumerate all of the more important functions which devolve upon the service manager as the result of experience in both industrial and commercial enterprises.

Selection and Assignment of Employees

The judicious selection and assignment of applicants may be regarded as the basic function of a service department. Public interest in the vocational guidance movement has in-

tensified the demand for better qualified persons to undertake this difficult task. The interviewers ought to be experienced men and women, persons of maturity, thoroughly familiar

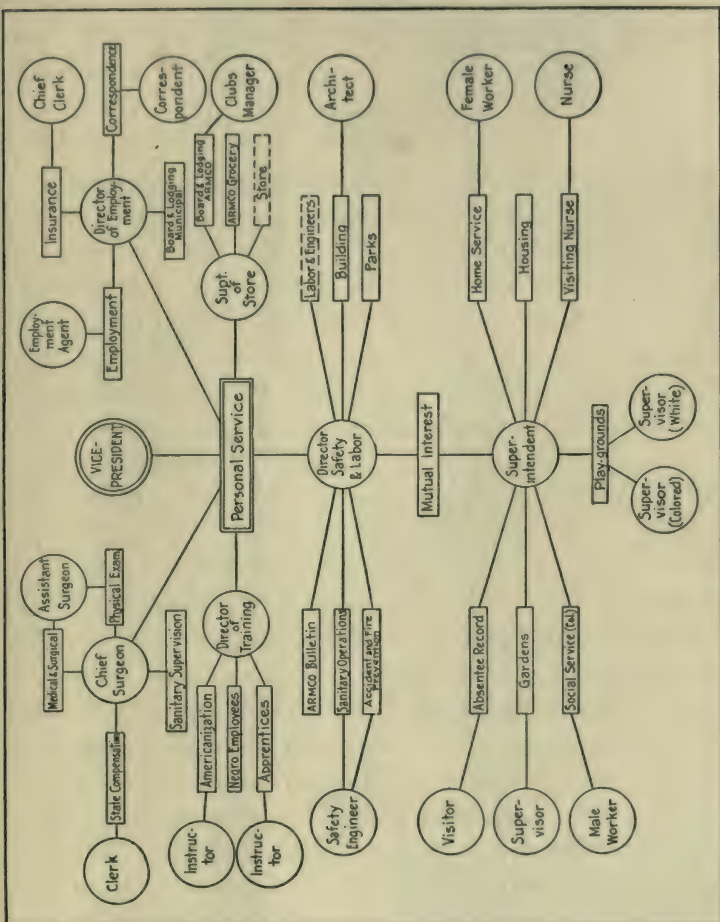

Figure 37. Industrial Relations Organization Chart
Plan of the American Rolling Mill Company, Middletown, Ohio.

with the work in every department, and keen judges of human nature. If their advice is wisely given they become the "vocational counselors for industry." The real work of the service department begins, however, with the phase of occupational

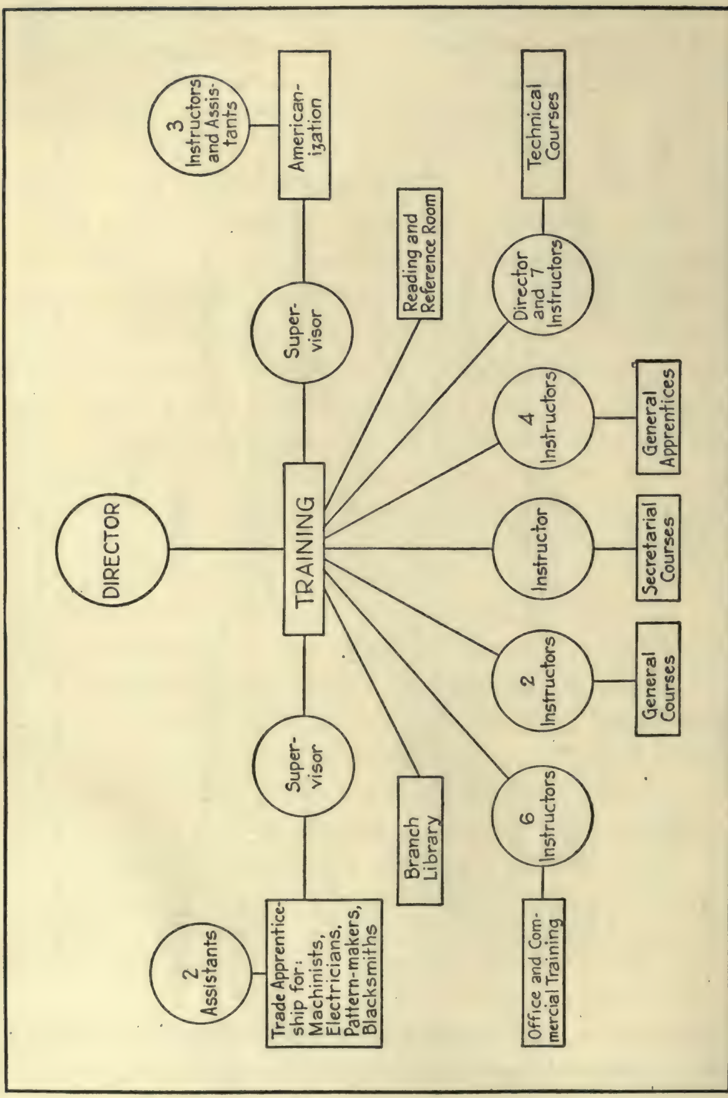

Figure 38. Training Department Chart

Plan of the American Rolling Mill Company, Middletown, Ohio.

adjustment and training, a field about which too little of practical worth is known, but in which service of the highest value can be rendered. It is our present purpose to define the scope of the training and adjustment functions and to show how they are related to other employment management activities.

Training the Employee

Figure 39 includes an outline of the educational and training work which may come under the control of a service manager. Certain of the activities listed are capable of sharp separation as belonging to a group of "training" functions designed to increase efficiency directly through imparting applied technical knowledge, skill, or dexterity. In this category belong supervision of apprentices, the vestibule school, short-unit training courses for special groups, and the work done by shop instructors.

Another group of instruction plans, represented in this chart under the heading of "General Education," is intended to increase the employee's general efficiency, improve his qualifications as a citizen, and add to the satisfaction or enjoyment which he takes in his work. They call for the co-operation of other divisions of the employment department and of agencies outside of the plant. Some instruction in personal hygiene, for example, is given by the public schools, but in the factory it takes on specialized forms because of peculiar occupational hazards. Furthermore, fresh developments in physiology and medicine as well as the manifest inability of the child to acquire and assimilate all of the knowledge necessary to the health adjustments of later years, make community and plant health campaigns of vital importance. Here the director of industrial training will need the assistance of the nurses and physicians in his factory and will naturally co-operate with the local public health officers.

All of the labor maintenance functions suggested under "Health and Safety" and "Co-operative and Service Activities" have certain mechanical or technical aspects. The installation of safety devices, the management of a cafeteria

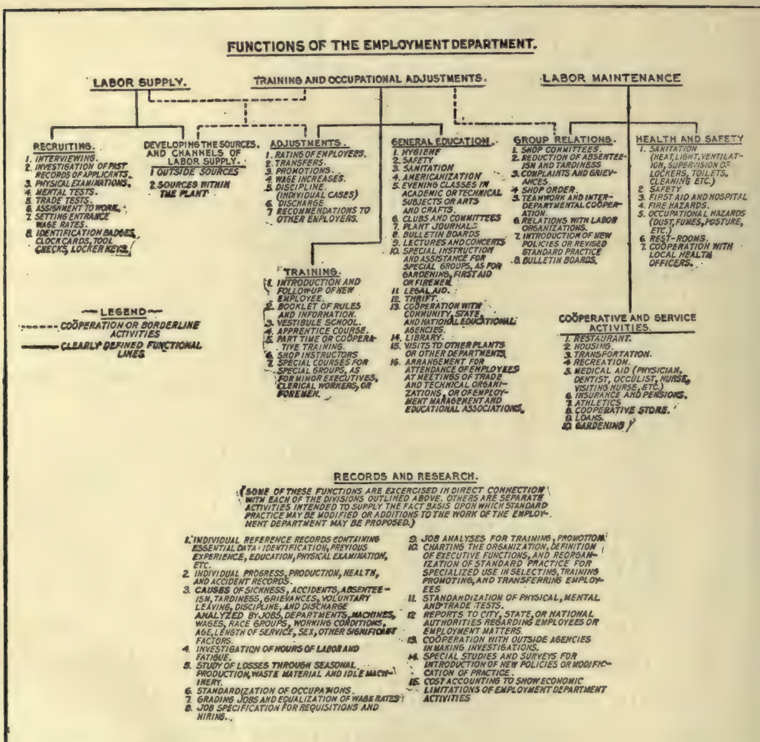

Figure 39. Chart Showing Functions of Employment Department
Used by courtesy of *Industrial Management.*

or a gymnasium, or the equipment and maintenance of a dental clinic, may be viewed entirely as work dealing with mechanisms provided for the improvement of safety or health. On the other hand, each of these matters presents an educational phase as well. Safety prevention is largely a matter

of training and propaganda, while an effective use of gymnasium, cafeteria, or clinic depends upon instruction in personal hygiene.

Making Adjustments

There are two border-line groups of functions lying between training and the recruiting of labor. The life histories of minor executives as well as of the more important industrial leaders are usually dotted with a succession of occupational adjustments—transfers from job to job or from plant to plant, promotions, discipline cases, and even discharge. Two objects should be attained in making these adjustments: justice to the individual, and economy in production. Both are dependent upon *rating records,* which indicate the need for readjustment, and upon *training,* which either makes the worker efficient in his present position or fits him for a new one. For whichever of the two purposes training is employed, connection must be maintained with the recruiting functions which assist in keeping the labor supply at the level demanded by production plans.

Training is also closely connected with labor supply in developing the resources within the plant and the means of utilizing them. Particularly is this true of the sources and channels of supply for executive or clerical positions and highly skilled trades.

"Group Relations"

Another series of border-line functions appear under "Group Relations." A capable director of industrial training will interest himself and his staff in the educational aspects of shop order, teamwork, absenteeism and tardiness, and the work of shop committees. While these matters, so far as their routine regulation is concerned, naturally come under the employment or service manager, they all present problems which

yield to treatment from the angle of direct instruction, the diffusion of information, or educational research.

It may be necessary under certain conditions to keep industrial training separate from other matters which properly belong under the control of the service manager. Theoretically, it seems to be a proper part of the work of his department. From the time that the employee enters the company he is then under the supervision of a single department. By keeping all of his records in one place, or under the surveillance of one authority, those who are made responsible for his progress are better able to keep in touch with his needs, they are in a better position to rate him or to promote him, and are the better judges of the justice of any complaint which is made against his character or efficiency.

Relation of Service Manager and Director of Training

In some plants the employment manager in charge of the functions listed on the chart under "Labor Supply" and "Labor Maintenance," is placed on an equal basis with the director of training and both report to a vice-president in charge of industrial relations. Another plan, which has about equal advantages, is to place all employment and training activities under one responsible head reporting direct to the general manager. In no case ought the training and occupational adjustment functions to be controlled by a separate head reporting to a production superintendent. They are much too important and have too close a relation to other employment functions to allow them thus to be subjected to the dangers of overlapping authority, slow action, and lack of enlightened guidance.

It is equally undesirable to have the administration of training under an employment manager who is unfitted for the task either by temperament or because of the lack of educational preparation. Companies frequently begin to

organize employment activities by placing someone in charge of recruiting labor. As the work grows and a director of education, an industrial physician, a safety engineer, and other staff experts are added, it may become evident that the man first engaged as employment manager is not capable of directing the enlarged undertaking. The usual alternatives which then present themselves are to have the new executives report to the general manager, or to engage a supervisor of industrial relations. In some cases it happens that the plant physician or director of training is himself selected as head of employee relations.

Value of Trained Staff Executives

The fact that a firm has placed the supervision of employment or industrial relations in the hands of a functionalized department gives some assurance that children who seek positions will be given work suited to their abilities and that a systematic effort will be made to co-operate with all helpful agencies in training them, preparing them for advancement, and protecting their best interests. No large establishment can hope to promote educational activities either within or outside of the plant unless it has the services of trained staff executives.

Education and training fall naturally into the personnel relations group of functions. The executive in charge should be under an employment or service manager with extensive powers or a vice-president controlling labor policies. Although the employment management movement is of recent origin, it has already demonstrated the possibility of fundamental transformations in labor policies and working conditions. Much of the future success of the movement depends upon the ability of employment managers clearly to define and solve their training problems.

CHAPTER IX

THE NEW APPRENTICESHIP

Stimulus of War

Three years of abnormal labor conditions during the war greatly hastened the evolution of apprenticeship which had been taking place slowly in the United States for ten years previous to 1915. Industrial plants under war-emergency pressure devised intensive training plans which for the time being almost entirely superseded the older methods.

The greatest demand was for semiskilled mechanics who could operate one machine or perform a few simple operations that could be taught in a few days or a few weeks at most. High rates of pay and the response to the nation's need attracted those who were just entering upon their terms of apprenticeship as well as those who would never have gone into the shops to learn a trade in ordinary times. Manufacturing plants producing staple articles which were not greatly increased in price, and railroad shops where the income was almost stationary, were unable to secure new apprentices at reasonable rates or to hold young men already in their employ to long-term indentures. This situation, coupled with the withdrawal of many apprentices for military service, demoralized the only means in use in many shops for training new employees or recruiting the executive ranks. The intensive training methods to which recourse was made constituted in a way a rough-and-ready form of apprenticeship.

It should be stated that intensive training for single operations, although successful as a war measure, is satisfactory in peace times neither to employers nor to workmen. It is

useful only in highly specialized factory departments, and is not adapted to work demanding a high grade of skill and technical knowledge, nor to the majority of trades where the skilled mechanic must be familiar with a variety of materials, tools, machines, and processes. On the other hand, there are so many objections to the older forms of apprenticeship that it is unlikely that they can long persist without some thorough reconstruction.

The New Apprenticeship—Aim and Scope

The extent of the modifications attempted before the war may be judged by the fact that from 1905 to 1912 twenty-two different railroad systems in the United States established apprentice schools for their shops or motive power departments. By 1916, several of these roads were ready to introduce special training for section hands, for laborers, helpers, and handy men in the shops, and for office employees, but because of unsettled labor conditions little was accomplished except in training for clerical positions. A similar development took place during the same period among printing establishments, large machine-shops, locomotive works, and manufacturers of electrical supplies. The aim in all of these schools was to improve the character of the practical experience gained during the term of apprenticeship, at the same time giving instruction in related technical subjects. Shopwork was more carefully scheduled and supervised to the end that each learner might have opportunity to spend some time in each of the important divisions of the trade. In some cases, special apprentice shops were built where the students were employed on productive work, and in others the apprentices were partly or wholly under the guidance of instructors while employed in the plant. The system was changed from one in which the apprentice was entirely at the mercy of the foremen, often gaining experience in only a small section of the trade and

receiving no theoretical instruction, to one which offered a well-rounded trade experience combined with enough technical instruction to produce an intelligent craftsman worthy of promotion and consequent increase in wages.

Retention of Older Forms

It ought not by any means to be supposed, however, that the older forms of apprenticeship had been entirely discarded. Nearly all of the mechanical trades and the majority of skilled factory occupations were still being entered by an apprenticeship of from three to five years with no technical instruction available outside of that offered by public or private schools in evening classes.

The United States census for 1910 gives the following figures for apprentices in manufacturing and mechanical industries. The census of 1920 undoubtedly shows many changes because of the altered industrial conditions.

	Male	Female	Total
Apprentices to building and hand trades	27,999	32	28,031
Dressmakers' and milliners' apprentices	31	11,980	12,011
Other apprentices	75,339	3,583	78,922
Total	103,369	15,595	118,964

Figure 40. Statistics of Apprentices in Manufacturing and Mechanical Industries (1910)

Figure 41 gives the number of apprentices in several cities with a population of 100,000 or over, showing for each city the number of apprentices in comparison with the number of wage-earners in the manufacturing and mechanical industries.

City	Total No. Employed in Manufacturing and Mechanical Industries		Apprentices to Building and Hand Trades		Other Apprentices		Total No. of Apprentices	
	Male	Female	Male	Female	Male	Female	Male	Female
Albany, N. Y.	13,059	4,011	122	....	204	7	326	7
Baltimore, Md.	78,300	28,111	285	....	1,061	55	1,346	55
Boston, Mass.	86,020	27,260	352	....	1,116	81	1,468	81
Chicago, Ill.	350,359	71,381	1,023	1	3,603	309	4,626	310
Cincinnati, Ohio	59,247	16,605	190	1	701	50	891	51
Detroit, Mich.	97,812	17,696	180	....	769	73	949	73
Indianapolis, Ind.	40,106	6,964	72	....	488	26	560	26
Los Angeles, Cal.	39,590	6,041	153	....	373	19	526	19
Lowell, Mass.	23,480	13,038	35	....	124	1	159	1
Milwaukee, Wis.	71,504	15,057	313	....	1,203	48	1,516	48
Minneapolis, Minn.	45,250	8,000	142	....	412	13	554	13
New York, N. Y.	665,538	207,959	2,174	5	4,865	399	7,039	404
Manhattan Borough	319,599	124,607	743	3	1,517	180	2,260	183
Newark, N. J.	63,213	15,847	322	2	924	39	1,246	41
Oakland, Cal.	19,020	2,568	142	....	238	12	380	12
Omaha, Nebr.	15,546	1,857	60	....	154	4	214	4
Philadelphia, Pa.	256,843	83,065	1,255	2	4,140	258	5,395	260
Pittsburgh, Pa.	93,342	11,230	322	1	1,067	41	1,389	42
Portland, Ore.	36,613	3,776	113	....	237	5	350	5
Providence, R. I.	41,579	14,498	73	....	451	10	524	10
Richmond, Va.	19,214	5,886	173	....	222	13	395	13
Rochester, N. Y.	40,875	12,360	161	....	408	25	569	25
St. Louis, Mo.	108,538	24,613	346	2	1,016	92	1,362	94
San Francisco, Cal.	61,785	9,327	224	....	619	34	843	34
Seattle, Wash.	36,504	3,135	108	....	248	5	356	5
Syracuse, N. Y.	24,944	4,910	95	....	265	21	360	21
Worcester, Mass.	29,228	7,099	106	....	413	11	519	11
Total	2,737,108	746,901	9,284	17	26,838	1,831	36,122	1,848

Figure 41. Table Showing Extent of Apprenticeship in 27 Cities in 1910

United States Census, 1910, Vol. IV, page 152. Exclusive of apprentices to milliners and dressmakers.

Disadvantages to Apprentice

During the past two decades apprenticeship has been more advantageous to the employer than to the learner. Wages were small in comparison with those paid journeymen or helpers on the same grade of work, and the term of indenture was usually long enough to insure a fair return from the boy during the last year of his service. In large factories engaged mainly on monotonous repetitive processes, there was a tendency to regard the training of apprentices as a needless waste of time, and in some cases smaller shops employing skilled craftsmen preferred to promote laborers and helpers, but in the majority of industries apprenticeship was considered an economical way to recruit the ranks of foremen, executives, and skilled workmen. Especially was this true among manufacturing machinists, coppersmiths, jewelers, silversmiths, and the building trades.

1. *Retardation.* From the point of view of the apprentice, however, there were many drawbacks to this method of entering the ranks of skilled workmen. All too frequently apprentices were exploited by being kept for a year or more on elementary operations such as running errands, sweeping, filing, and doing simple benchwork. Shops where the subdivision of processes had been carried to the extreme were naturally the ones most likely to consider it profitable to retard the boy's progress. This meant that the apprentice was expected to do the work of a journeyman or helper at a reduced rate of pay without any increased opportunity for learning the various aspects of the trade. The term of apprenticeship was often much longer than the exactions of the work to be learned really necessitated. As a result the apprentice fell into an unworkman-like attitude toward his task, loitering instead of putting forth the full amount of his energy, and was in danger of developing an embittered attitude of mind toward his employer.

2. *Unskilled Instructors.* Apprenticeship is open to the same objections as may be leveled at any form of training which looks to skilled workmen and foremen to furnish all of the instruction. Often unqualified by temperament and experience as teachers, jealous of the time spent in helping beginners, and inclined, very likely, to regard the apprentice as an interloper who is apt to be promoted to a position higher than any to which they can aspire, it is only natural that their teaching should be quite ineffective.

The arguments against the foreman as an instructor have been well stated by H. L. Gantt in his "Work, Wages, and Profits."

> The ordinary foreman of the shop must not be called upon to do the work of the expert. His business under the usual conditions of management is that of an executive, and he is invariably so busy attending to his routine duties that he has but little time to make investigations into the best method of doing work. He can only give instructions according to the experience he has had in the past, or according to the knowledge he may pick up at odd times. Again, he frequently feels compelled to allow work to be done inefficiently because he has no man that can do it better, and no time to train a new man. For these reasons it is desirable that the development of improved methods, the setting of tasks in accordance with these methods, and the training of workmen to perform these tasks, should be in the hands of someone other than the foreman.

3. *Loss of Opportunity.* The changed relations which exist between the employer and employee in progressive establishments gives rise to another objection to the apprenticeship practiced a century ago. Young men are loath to sign an agreement which makes them appear to be in the position of being bound to a particular firm or of serving a "master." The impression is wide-spread that a trade can be entered much more advantageously by stealing it, and that the young

man makes a mistake to indenture himself for a long period of service when other more attractive positions are likely to open to him at any time. The excessive labor turnover of the war period, the example of highly paid operatives taught in a few weeks to perform skilled operations in vestibule schools, and the constant demand for workers on the part of newly established industries willing to pay high wages for semiskilled artisans, have all had their part in decreasing the number who are willing to undertake a long-term apprenticeship.

Efforts at Improvement

Three measures for improving apprenticeship under present-day conditions have been on trial: trade union control through collective bargaining agreements, state supervision, and the establishment of corporation apprentice schools. Continuation schools, and evening classes maintained by public and private institutions have given assistance to apprentices in a limited number of trades, but have had but little effect upon apprenticeship as a whole.

Trade Union Control

It has already been pointed out that the trade unions began nearly sixty years ago to demand better regulation of apprenticeship. Collective bargaining agreements for this purpose are now being improved and extended in scope. Appendix J on page 387 contains several samples of such apprenticeship regulations. A reduction in the number of years required to complete the term of apprenticeship as well as special allowances for previous experience and training are the outstanding tendencies in many trades. In very few cases have the unions been able to set up schools of their own or to provide means for examining apprentices. The plan under which the painters, decorators, and paperhangers of

Springfield, Massachusetts, provide an examining board composed of equal numbers from the local union and employers is a noteworthy exception. (See page 391.)

State Supervision

State control of apprenticeship was practiced in early colonial times. The tenth special report of the United States Commissioner of Labor for 1904 gives a digest of apprentice laws, the majority of which refer to the age at which children may be bound, the obligations of the master to provide suitable schooling, and the practice of apprenticing minors without their consent or the consent of parents or guardians. Practically every state in the union has general enactments of this character among its statutes, but only one state, Wisconsin, has endeavored to set up a special organization for supervising and training apprentices. No federal legislation exists on the subject except an act of January 12, 1905, which authorizes the public printer to employ apprentices not to exceed twenty-five at any time when in his judgment they are necessary to the economical management of his office.

Wisconsin—A Comprehensive Plan

A Wisconsin law passed in 1915 provides machinery designed to control apprenticeship throughout the state. The law had its inception in the efforts made by Milwaukee manufacturers, particularly in the metal trades and in the foundry business, to establish private apprenticeship systems. These men realized after experimenting for some years that no apprentice system could be successful under modern conditions unless training was quite generally undertaken. Their main difficulty was the willingness of a few employers to follow the parasitical practice of obtaining skilled help from others who were investing in educational work. Furthermore, constant friction arose between manufacturers and members

of the trade unions. The union resented the dictation of employers in matters of apprenticeship and held to the belief that apprentices were never able to make a fair bargain with the management. The advocacy of state supervision of apprenticeship came about as a logical result of the anxiety of all parties concerned to secure better conditions and their inability to put any adequate machinery of control into operation.

The first act, passed in 1911, proved too exacting in its demands and was superseded by the Wisconsin Apprenticeship Law of 1915. Under this law the State Industrial Commission is given power to classify trades and industries, supervise apprentice contracts, and mediate differences between apprentices and their employers. The commission has established a state apprentice committee composed of employers who serve as an advisory board without pay, and a supervisor of apprenticeship who is the executive officer empowered to carry on the work throughout the state.

Classification of Trades

The commission endeavors to classify trades in such a way as to determine to what extent various occupations are suitable for training under the apprenticeship system. Indenture forms are drawn up which conform to the statute and suit the needs of various trades. Every apprenticeship contract is reviewed to make sure that it conforms to the requirements of the law and that it is equitable to both employer and apprentice.

New Features

The features of the work which are essentially new are the supervision of apprentice boys in the shop, and the joint maintenance by the state and the municipalities of day vocational schools. The supervisor or one of his agents visits each

boy to see that there is the right kind of opportunity for experience and that the employer's work is being performed in a satisfactory manner. Difficulties and disputes are adjusted as they occur and suggestions are made for improving the schedule of shop training where that seems necessary. Each student spends half a day a week, on the employer's time, studying safety, hygiene, economics, principles of citizenship, and technical subjects closely related to the trade in which he is employed. Graduate apprentices receive a diploma bearing the seal of the Industrial Commission and countersigned by the employer. A diploma is granted only on the basis of a satisfactory record as shown by the reports received by the commission from the employer and the school.

Other functions of the commission are to determine trade standards and to co-operate with the State Board of Vocational Education in preparing courses of study for apprentices. A monthly sheet called *The Wisconsin Apprentice* is published to create interest in trade topics and to furnish a clearing house of information for employers, apprentices, cities, and state departments.

Forum meetings and lectures, personal conferences, and the dissemination of literature throughout the state are utilized for the creation of public opinion favorable to apprenticeship. Employers are approached and an endeavor is made to show that apprenticeship is justified on an economic basis.

Washington's Minimum Wage Law

The state of Washington enacted a minimum wage law for women in 1913 which places the supervision of female apprentices in the hands of a board of five members known as the Industrial Welfare Commission. Section 13 of the minimum wage law gives the commission power to arrange schedules for learners under 18 years of age and for women having physical disabilities. The work accomplished by the

commission under this provision is thus described by the acting secretary, Mrs. W. H. Udall:

> This work demanded personal investigation by the members in all occupations before the adoption of a comprehensive and necessarily intricate system of apprenticeships, and meant much clerical work in the office in administering such a system, but we have no hesitancy in saying that when finally adopted it has had a successful administration.
>
> To obtain the information upon which to base wage schedules and other regulations, the books of the firms were inspected, the earnings of groups of girls covering their first year of employment were carefully compiled, and personal interviews with the girls were held. A schedule was then adopted covering the situation of the average worker.
>
> In any occupation such as chamber-work, restaurant and ice-cream parlor work no apprenticeship is considered necessary. Garment-making, printing, salesmanship, millinery, chocolate dipping, hair manufacturing and similar occupations take the longest periods.
>
> The application blank must be filled out by the employee and sent to our office the same day she begins her work, and when issued the license is dated that day; any time worked without a license is subject to the full minimum wage. The license is in duplicate form; the employee is sent the original and the employer the duplicate, so there can be no misunderstanding as to the period or the wage to be paid.
>
> In large establishments where many apprentices are needed a monthly report is required, which enables this office to check up our files and keep the firm within the percentage allowed.
>
> Our system has never been taken into the courts, and we believe that it has been a great benefit to the women of the state.

Mrs. Udall further explains that licenses are very infrequently issued in case of physical disability of the applicant and then only after a personal investigation by some member of the labor department. In the entire state not more than

forty-five persons hold licenses under such conditions, and these have been granted for disabilities such as old age, rheumatism, loss of one finger, and partial paralysis.

Possible Growth of State Supervision

The fact that the licensing of such persons as plumbers, gasfitters, motion picture operators, aviators, and stationary, locomotive, and steamship engineers has been everywhere regarded as a legitimate function of the state government, points the way to the extension of the Wisconsin and Washington plans to the supervision and training of learners in many trades. It has been easier, perhaps, to control the work in connection with trades where apprenticeship was fairly well established and where the state could look to union labor organizations and employers to assist in maintaining high standards. Is it not reasonable to suppose, however, that the state's power of granting a license may well furnish the opening wedge for beginning instruction and supervision of a like kind in other trades?

Corporation Schools

Beginning with the work inaugurated by several railroad companies about 1890, a number of corporations have installed schools in which part of the time of each apprentice is devoted to related academic and technical subjects, and in which the shopwork is so scheduled and supervised as to give a satisfactory experience in the practice of the trade.

Grand Trunk Railroad a Pioneer

Among the railroads, the Grand Trunk system, with headquarters at Montreal, was a pioneer in establishing apprentice schools. About 1899 it was decided to start a drawing class for apprentices, in the hope of attracting better educated boys

into the service and to provide more adequate opportunities for them to develop into skilled and intelligent mechanics. For some years previous to this time groups of apprentices and others in the employ of the Grand Trunk who wished to improve themselves in mechanical drawing or other technical subjects had been in the custom of hiring teachers, each student contributing a small amount per month for instruction. As a rule such classes had not been well attended and the company felt that something should be attempted which would be more definitely under its own control and subject to higher instructional standards.

In beginning the work in 1899, all apprentices were placed in one class irrespective of age or ability. The next year classes were graded and special evenings were set apart for instruction in practical shop methods. In 1901 a system of examinations was instituted to determine promotion from one portion of the shop or from one machine to the other, as well as an advance in pay. A small text-book was compiled for home study, and examinations were given at the end of the year based on the shopwork each apprentice had accomplished and including certain theoretical questions and a test in mechanical drawing. About 1904 the system was extended over the entire motive power department of the Grand Trunk System, and from that time on was handled by the company according to the rules approved by the superintendent.

During the next two years practical mechanics was made a part of the course and compulsory attendance upon all classes was written into the indenture. The subjects taught were added to from time to time until they now comprise a large range of topics, graded to suit the student's ability, from simple arithmetic to higher mathematics, mechanics, machine design, and mechanical drawing. Instruction is given during the fall and winter months for two evenings each week. The examination system is retained as an essential part of the

program, but has been supplemented by a system of competitions and prizes. The period of apprenticeship is five years, the rates of pay increasing from 8 cents per hour the first year to 17 cents the fifth year. A bonus of $25 is paid for the successful completion of the course. The company also pays for all books and materials used in the evening classes except mechanical drawing instruments.

American Locomotive Company—Preliminary Requirements

The American Locomotive Company of Schenectady, New York, offers apprenticeship courses in drafting, shop practice, pattern-making, molding, electrical construction, printing, and tool-making. Applicants for the course in drafting are expected to be between 16 and 19 years of age and must pass a special examination intended to test general mental capacity rather than actual attainment in scholarship. Boys who have completed one year of high school and at least one term of algebra have the requisite amount of academic schooling to be admitted to the test. The following outline suggests the nature of the examination:

1. Test of ability to express ideas: Letter of application stating why applicant wishes to take the course.
2. Test in sense of proportion and detail: Sketching of some object in the room involving simple proportions.
3. Test to determine whether applicant is mechanically minded along practical lines: Description of something that applicant has made.
4. General knowledge of principles involved in obtaining mechanical power: Simple description of how power is obtained for a locomotive or an automobile.
5. Test in ability to reason as related to locomotive problems: Working out problems of how two trains

are to pass one another on a single track with limited siding facilities.

6. Problems in algebra.

Drafting Course

The drafting course is planned to cover four years. Of the forty-four working hours in each week, three are spent in the schoolroom. The text-book work covers machine design based upon actual practice in designing locomotives and certain related mathematical problems. The problems are estimated to require about eight hours of study outside of the time spent in the schoolroom. No regular classes are held, but instead each apprentice receives individual instruction during the class hour. It frequently happens that apprentices who do good work are able to complete the course in considerably less than four years. Apprentices who obtain a rating of *B* grade receive two cents more per hour than the base rate, while those who obtain an *A* rate receive a bonus of three cents per hour. The base rate is advanced upon completion of each six months' assignment of problems and is independent of the time spent in the course. Credit may also be given for overtime and occasionally for previous experience. The students are encouraged to study during the evening in the general drawing-room or in the drafting-room, where access may be had to the company standards which are referred to in the text. One hour is spent each month in visits to the shops, taking notes which are discussed during the following class period.

Shop Apprentice Course

Applicants for the shop apprentice course at the Schenectady plant are not required to pass the preliminary examination but at least one year's high school education is considered desirable, and only boys between the ages of 16 and 19 are

accepted. Fifty hours constitute a working week, of which one and one-half hours are spent in classroom exercises. One-half hour of this time is at the apprentice's expense; the other hour is on the company's time. Instruction is offered in shop mathematics, blue-print reading, and the principles of shop practice. Frequent inspection trips to the shops allow the apprentice to learn just how the work he is doing is used in the final construction of locomotives, while transfer of students from one shop to another is so planned as to give experience in manipulating all of the essential types of machines. No cash bonus is paid at the completion of the course, although each apprentice receives a certificate and is given an increase in pay with such opportunity for further advancement as his ability warrants.

The courses in pattern-making, molding and core-making, electrical work and printing, follow the same general lines as the course in shop practice except that there is no classroom work for apprentices in the foundry, and the printing and electrical courses require three hours and one hour a week respectively for class instruction.

For outlines of other apprentice courses, the reader is referred to Appendices B to D, inclusive.

National Association of Corporation Schools—Recommendations

The railroad section of the Committee on Trade Apprenticeship of the National Association of Corporation Schools made several excellent recommendations regarding the general qualifications of apprentices and their training in their sixth annual report prepared in 1918. In the opinion of the committee, apprentices should not be employed in railroad-shops under 16 years of age nor over 21 years of age, excepting freight-car carpenter apprentices and college or technical school graduates pursuing special courses. A medical ex-

amination similar to that required by life insurance companies is proposed as an entrance requirement, but no educational qualifications are insisted upon. The committee recommends that in all railroad-shops employing twelve or more apprentices a regular school be maintained in which instruction can be given in mechanical and free-hand drawing, reading and interpretation of blue-prints, shop mathematics, the simple elements of mechanics, and such other subjects as bear directly upon the student's trade. School instruction should occupy at least four hours a week, given in two periods of two hours each. Shops employing twenty or more apprentices are urged to employ a regular shop instructor and it is suggested that smaller shops may employ a joint instructor to handle both technical subjects and shop practice. During the first six months' period of apprenticeship a considerable variety of work should be undertaken so that the apprentice may be helped in deciding upon the kind of work which he is best fitted to undertake. This probationary period also serves the purpose of weeding out those who are unfitted for advanced work, either in the shop or in the school.

The committee's report contains detailed outlines of the shopwork which should be undertaken by apprentices in each of the trades represented in railroad shops. For example, electricians are to have their shop experience diversified as follows:

1. Helping electricians around a railroad shop—six months.
2. Car wiring and wiring repairs—twelve months.
3. Wiring buildings and other wiring—twelve months.
4. With electrician on axle lighting equipment—six months.
5. Electromotive wiring—six months.
6. With an electrician on motor repairing and installation—six months.

The Program Criticized

In addition to the recommendations made by this committee, all of which appear to be sound and capable of being applied to the work of corporation apprentice schools of all kinds, certain criticisms which appear to be valid are made by investigators and instructors upon the work now being done.

The text-book material is poorly developed. Particularly noticeable is the lack of good problem material, illustrative exercises, and sound exposition of principles. Courses which are intended to prepare for executive positions neglect the management side, and where it is given almost no problems are presented. The student too often gets his lessons by memorizing and through lectures—exactly the features which business men have long criticized in academic institutions.

Good teaching is the exception rather than the rule. To make sure of getting practical work done, tradesmen have been employed as instructors with little or no preliminary preparation for teaching and no opportunities for professional improvement in service.

In some schools, production has been held to be of more importance than learning, with the result that apprentices have been kept too long on unimportant work.

More significance should be attached to grading apprentices according to ability and to rating their work so that more capable students can make rapid progress and shorten the period of apprenticeship.

Co-operative and part-time classes should receive more attention than they have in the past. The plan used at Beverly, Massachusetts, for training apprentices for the United Shoe Machinery Company has many advantages over most schools maintained by the plant alone.

Probable Future Development

Because the apprentice under "modern complicated cor-

porate conditions" fails to learn all the mystery of the trade, and finishes his term without any appreciation of the technical aspects of his work or of the real problems involved in industrial management, some method should be devised for improving and supplementing his shop experience. This is now being accomplished in some instances by corporation schools or by part-time and evening classes in outside educational institutions. These means of supplementary training need to be more widely adopted. General regulations regarding apprenticeship appear on the statute books of all states, but only two have enacted laws providing for state supervision and training of apprentices.

The trend of future development is likely to be toward extending the work done by private companies, enlarging the scope of state supervision, and providing supplementary technical instruction in public schools.

CHAPTER X

VESTIBULE TRAINING AND IMPROVEMENT IN SERVICE

Value of Vestibule Training

The principles of production management upon which vestibule training rests were first enunciated by the leaders of the scientific management movement. H. L. Gantt, in his "Work, Wages, and Profits," Harrington Emerson, in his "Twelve Principles of Efficiency," and F. W. Taylor, in all of his studies, point to the need for efficient training to follow up the work of the planning department. When an employee is placed at new work without any preliminary instruction, he learns the faults of other employees who teach him, he learns slowly, consumes the time of skilled workmen which ought to be devoted to their regular tasks, and the losses from scrap are large.

There is usually only one best way in which an operation can be performed, but there are numberless faulty methods of attempting it. In nearly every case the new employee is neglected and because he learns the work in his own way he soon habitually follows a wrong method. Although many concerns have tried to overcome the losses incurred through faulty methods by inaugurating time and motion study, and by utilizing the services of staff experts, comparatively few have yet successfully planned for getting new standard practice promptly incorporated into the working habits of their employees. Money spent in scientific investigations to determine the proper appliances and materials and

the best way of performing each task is largely wasted unless instructors are provided who are competent and willing to teach the workmen.

Suggestions of H. L. Gantt

Gantt devoted particular attention to this difficulty in his analysis of the human problems in factory management. The suggestions in his "Work, Wages, and Profits," regarding the training of employees may be summarized as follows:

1. Make a detailed investigation of each piece of work which will discover and record the best methods and standard time for every operation.
2. Insist upon the selection of high-grade workmen who have teaching ability to instruct beginners as well as old employees who are inefficient.
3. Whenever high efficiency is obtained, compensate liberally not only those who actually do the work, but also those who teach and those who supply materials and appliances which enable the workmen to maintain a high rate of production.

A Typical Vestibule School

The experience of the Recording and Computing Machines Company of Dayton, Ohio, affords a good example of the way in which vestibule schools were established during the war as well as an excellent statement of some of the fundamental principles involved in their management. This factory employed in 1918 about 8,600 people, of whom 5,000 were women. Many of the operatives were engaged in manufacturing Russian combination time fuses, the work being done in aluminum, brass, and various other metals, and requiring accurate machining and close measurements. Manu-

facturing limits often ran as low as .0005 inch in metals quite difficult to work.

1. *Meeting a Skilled Labor Shortage.* The supply of labor in Dayton in 1917 seemed inadequate to meet either existing or future demands. Men were scarce and the few who were available were either in clerical occupations or belonged to trades not at all allied to the mechanical work the plant had to offer, such as brick laying, structural steel working, and masonry. The men engaged in these trades, intelligent and accustomed to high wages, were naturally unwilling to accept other war work at laborer's pay, and yet were unable to bridge the gap caused by their ignorance of mechanical methods. It was the function of the new vestibule school to train these men and at the same time to make use of the large number of women who were eager to do their part in winning the war.

2. *Forming a Training Department.* The training department was located in a well-lighted room entirely separate from the factory. In it were placed all of the different types of machines upon which training was considered necessary, such as hand-turret screw machines, automatic screw machines, thread millers, drill presses, and special machinery designed and built by the company. In addition there were the necessary benches and fixtures for teaching inspection and assembly. The employment department was charged with the selection of employees, and when students had finished their training in the school, requisitions were filled for the factory departments through the same office. The foremen were never permitted to employ people nor were they allowed the right of discharge without the sanction of the employment department.

3. *Selecting Instructors.* For the head of the training school a workman was selected who was an expert mechanic and operator, but the teachers in charge of female learners

were all women. Each teacher handled from three to five girls at a time, the number depending upon the nature of the work. Every student went through a preliminary study of the character of the metal being used, the nature and functions of the tools she was expected to handle, and the method of operating the machine. When the new employee started the work for herself, she was carefully supervised, her errors were corrected in a kindly manner, and every encouragement was given to help her to make as rapid progress as possible.

4. *Confidence Inspired.* Before the training department was started it was noticed that many new girls upon coming into the shop were extremely nervous. They would often break down and wish to leave the shop at once because of the fear of the large machine tools which appeared to them so dangerous and complicated. Their natural fear of the shop was multiplied by the fact that they were expected to begin their work in the midst of the rush and roar of the factory. In a separate shop under women teachers, confidence was gained at once. It was only natural for beginners to feel that if other women could accomplish the work without danger that they too could learn it rapidly.

5. *Purpose Limited.* No effort was made to train for more than one particular job. The training was not advertised as general mechanical education, but every pupil understood that she was being taught in a very short period and that if she came to have any mechanical skill it would have to be acquired through her work in the shop. In less than ten days the girls were trained to operate hand-turret lathes on work requiring a high degree of precision, and it is claimed by the company that these girls when entering the shop attacked the work on their machines with vigor and confidence. In less than three weeks they reached a high average of production and began to earn the bonuses distributed under a graduated system of pay.

6. *Continuation Training.* The training of the vestibule school was continued in the factory by carefully selected men known as "job bosses." Each of these supervisors had under his control only a small group of persons, the number ranging from seven to thirty according to the difficulty of the operation. The pay of the job boss depended in part upon the average bonus of all the operatives, and these men were carefully supervised to make sure that they understood the losses to the company which might be caused by injuring the health or welfare of those under their care.

7. *Results Achieved.* The following statements made in *Industrial Management,* May, 1918, by C. U. Carpenter of the Recording and Computing Machines Company indicate some of the results achieved after only a few months' experience with the training department:

> We have a large assembly department, employing over 2,000 girls. Two sets of prominent engineers who investigated the possibilities of production from this plant reported that the best output possible from this assembly division was 15,000 complete fuses per day in two shifts. By thoroughly training the girls we have been able to reach an average production of *38,000 per day in one shift.*
>
> In addition to the fuse work, our company is building optical instruments of a character that requires the greatest precision, much of the work being held within limits of .00025 inch. This work requires not only close manufacturing, but also most careful work in lens-making and grinding.
>
> Before beginning this work, the organization made a minute survey of each operation, no matter how small, involved in the production of these instruments. This included all the manufacturing, assembly and lens-grinding work. This company was compelled to build its own lens-grinding machinery, as none could be purchased in this country. When we finished this survey, we had before us a description of exactly what was required on each operation. There was necessarily much work that was entirely new to us,

as well as to other American manufacturers, owing to the lack of experience in this work in the United States.[1]

It is interesting to note that we were advised that it would be impossible for us to get any high-grade lens-grinders in the United States, and many dire prophecies were made as to our probable failure. However, we started the training school in the grinding of lenses, and have developed a high-grade body of lens-grinders, both men and women, within the past six weeks.

We produce our base forgings of aluminum on hand-turret screw machines. On this particular forging there are 56 gauging points, with allowable limits on different operations ranging from .0005 inch to .002 inch. In January, 1916, the average production of 31 women employees was eight pieces per hour. While the operatives were apparently busy at this rate of production, my experiments showed that there should be produced from those machines as a fair production an average of 35 pieces per hour. We put our old operatives into the training department, and within four weeks after the new and old operatives had been through this training department, the average production was raised to over 25 pieces per hour, and today the average is over 55 pieces per hour. The same results were obtained on all of our work, such as machining, inspection and assemblage.

It is particularly important and interesting to note that many of our most skilled operatives are men and women well along in life. We find that while the young worker has more vigor, the older one is usually more careful and steady, and more anxious to keep up a high average rate of production. Their continuous work on their jobs brings this average production up to that of the younger and more vigorous.

We have demonstrated that strong, healthy women can do work requiring great precision after they are thoroughly trained quite as well as skilled men mechanics. They work on hand-turret screw machines, hand millers, power millers, drill presses, thread millers, punch presses, routers and special machines of all types. They are remarkably efficient

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[1] Appendix F gives the detailed operations prepared by a rubber company for use as standard practice in its vestibule school.

as inspectors. We have also taught them to be excellent tool-makers.

Vestibule Schools in Great Britain

England utilized the vestibule school idea on a large scale during the war. As the outcome of a series of conferences between representatives of labor unions, employers, and government officials, a general argeement was reached which allowed the suspension of the usual trade rules and customs. This paved the way for methods of training which under ordinary conditions would have been quite unsatisfactory to organized labor. The unions agreed to have unskilled men and women trained in large numbers and in a brief period of time on highly specialized processes.

Three Forms

Training for munition work in England was conducted, so far as the work was supervised by the Ministry, under three different plans:

1. Training in technical schools.
2. Training in instructional factories.
3. Training in special ways—or attached to individual works.

Technical schools were all under the management of local authorities and financed and inspected by the Ministry of Munitions. They gave instruction in technical subjects in evening classes and trained students in day courses who later received training under production conditions in factories under government control.

The instructional factories were built to further the ruling idea that instruction could best be given under production conditions and were maintained for the most part in conjunction with works engaged in the manufacture of machinery

for other plants. But the most interesting feature of the entire scheme was the instructional bay or division of an actual factory or works. After a preliminary training at one or another of the technical schools, groups of girls were sent to the bays or divisions set aside in these factories where they could receive instruction to fit them for the work of the particular shop to which they were finally to be sent as operatives.

Instruction in the Factory Itself

One of the largest manufacturers supplying machines in quantities was Messrs. Alfred Herbert, Ltd., of Coventry. This firm placed at the disposal of the training section one of the bays at its training department to be used in this way. Many of the girls were taught to work as tool-setters for capstan lathes and were later sent to the factories where the lathes were being installed by the manufacturing concern. There the girls received their training on the actual machines, tools being supplied to the workers, so that when they took up their tasks no new conditions arose which were likely to undermine their confidence.[2]

In much the same way Hewlett and Blondeau, of Leagrave, placed a section of their works at the disposal of the training section for the teaching of various branches of aircraft construction, such as woodwork, frame and wing building, plate metal fittings, and erecting. Each girl was given a certain amount of instruction in a specialized branch of work and then transferred to the company's factory to work under the usual production conditions. She was then brought back to the training bay to complete her instruction before being sent out to any local firm requiring employees in that line of work.

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[2] United States Training and Dilution Service: "British Methods of Training Workers in War Industries."

In some centers supplementary courses were offered in micrometer reading and the use of gauges and calipers or in mechanical drawing and draftsmanship. Lectures on shop practice and theory were not frequently used except where necessary in the case of women who were learning the electrical trades.

Trend Toward Standardization

The English experience seemed to prove that training was most successful when manufacturing operations could be fully standardized and repetitive processes widely introduced. Heavy marine engineering or construction work where repetition was infrequent proved poorly adapted to the vestibule plan. Students who did not have a good general education and physique as well as some mechanical inclination were, of course, at a great disadvantage in attempting to prepare themselves in a short time.

One of the English munitions works established under government supervision to manufacture shells admirably exemplifies the way in which manufacturing processes may be adapted under emergency conditions to fit the vestibule plan. Instead of making a lathe capable of performing the fourteen operations required on each shell, this firm constructed fourteen different types of machines, each of which was adapted to a single operation and no more. The simplification of the mechanism in each case was carried to such a degree that girls and unskilled men with no previous acquaintance with the inside of an engineering plant could be taught to run the machines efficiently in a month or less. At the training center the courses were so arranged as to allow the newcomer to undertake only the simplest operations at first. As soon as he attained the standard degree of proficiency on the particular operation he was advanced to more difficult work on another machine.

French Experience

France felt, even more keenly than England, the shortage of skilled mechanics. Dilution was fostered by a government order making it compulsory for every factory employing 300 or more persons to maintain a training department. Exemptions were granted only after consideration by the Ministry or, in the case of smaller factories, where suitable arrangements could be made with some local technical school for training the workers.

In the French vestibule schools, an hour each day was commonly given to technical instruction, such as the reading of drawings, the nature of the materials and processes used in the shop, and the simple related principles of mechanics, physics, metallurgy, and chemistry.[3]

Supplementary Instruction in United States

There is a marked tendency in the United States to appreciate the need of teaching beginners in the vestibule school something of such matters as the following: the character and sources of the raw materials used; the general processes of manufacture and their relation to each other; the purpose and elementary principles involved in scheduling and planning; meaning of mechanical or technical terms in common use; the purposes and methods of inspection; quality standards; the use of micrometers and gauges; blue-print reading; interpretation of job tickets and instruction sheets; the care of machines and tools; elimination of waste; safety and hygiene; co-operation with the medical and employment departments. The majority of these matters are not taught at all, or at least very ineffectually by shop instructors or foremen, or even by vestibule teachers who are tradesmen without special training for teaching. Two methods may be used for giving

[3] Report of Committee on Industrial Education of the National Association of Manufacturers, May, 1918.

supplementary instruction. One is to place it in the hands of special teachers who have the time and the ability to collect and organize the necessary data. The other is to have the trade instructors take a special training course in the handling of this material.

Advantages of the Vestibule Method

The advantages of the vestibule method of training may be summarized under the following headings:

1. Instruction does not interfere with work being carried along in the normal process of manufacture.

2. Expensive machine tools and other department equipment can be kept up to standard production, thus decreasing the losses from fixed charges and overhead expense.

3. Breakage and waste of materials due to carelessness and lack of supervision are greatly minimized.

4. The bulk of the turnover is taken from the shop and kept in the school. Persons not fitted for the work are discovered before they cause the company a loss by being put on regular work. Ability along other lines can sometimes be discovered, thus allowing transfers to be made with the minimum loss to employer and employee.

5. The time of workmen and foremen can be given entirely to the routine duties of the shop.

6. Right methods can be taught in detail from the start, thus preventing workmen from falling into wasteful or inefficient habits which must later be overcome.

7. Learners have their habits fixed before becoming acquainted with methods of slighting their work in order to increase production.

8. Skilled workers and foremen are reluctant to teach beginners and do not adapt themselves to individual needs. This is overcome by securing trained instructors who devote more time to each beginner.

9. Few skilled workers are able to analyze operations into their elements and teach them in the best instructional order. This is accomplished by analyses made before the vestibule school is started, and standard practice insures that each instructor follows the approved procedure in teaching.

10. Better sequence of work in good instructional order can be maintained in the vestibule school than in the shop.[4]

11. Uniform methods and standards of quality can be insisted upon throughout the plant.

12. The general rules and regulations governing the habits and daily routine of workers can be taught before they are sent into production departments, thus tending to maintain better discipline.

13. Working conditions in the training section are less likely to cause nervousness and discouragement. This is particularly true with women employees, and has an important bearing upon the work of young persons, who are thus freed from the observation and ridicule of expert workers.

14. Emergency demands can be met where it would be impossible to train sufficient numbers in the shop within a reasonable length of time without seriously disturbing the flow of work.

15. The vestibule school gives opportunity for the experimental try-out of machines, tools, fixtures, and methods of operation before they are put into the factory. It is possible to combine the school and the experimental shop.

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[4] In training men in the shipyards it was found best to begin with simple work and then advance to more difficult operations. When instruction was given under the supervision of teachers who went with the students into the yard to work on different ships, it was possible to keep them on kinds of work which were suited to their advancement. Thus in learning bolting up, the beginner started with deck plates or deck houses and was gradually advanced to the more complicated sections of the hull. On the other hand, when a whole ship was given over to instruction purposes, it was found that it was impossible to maintain a proper instructional sequence. Chippers and calkers, for example, had an excessive amount of work to do because of the demand for erecting the ship within a reasonable length of time.

Disadvantages of the Vestibule Method

Among the disadvantages of the vestibule method of training pointed out by various manufacturers who have tried it, the following appear to be significant:

1. Fluctuations in the number of employees to be trained for a given operation may make it uneconomical to retain full-time instructors or maintain school equipment.

2. Production work is always better than work done for practice purposes on waste materials. Since commercial production is not always attainable in the vestibule school, this sometimes becomes a disadvantage.

3. Beginners tend to attain maximum production more quickly when associated with expert workers than when among unskilled companions.

4. The spirit of the students in the school may become that of careless learners rather than earnest workmen. In other words, the spirit of the schoolroom rather than of the shop is sometimes engendered.

5. Vestibule training often tends to become superficial and gives the worker no real understanding of shop procedure. It tends to limit the operator to one or at most a few simple tasks.

Small Classes

Experience in training large numbers of men in the shipyards and munition plants as well as in training technicians and tradesmen for the army has shown that the small class has a great advantage over the large group. The number who can be assigned to one instructor always depends upon the nature of the work to be taught. In the shipyards it was found that riveters trained in small classes reached the maximum production in 23 days as against 34 days required where they were taught in larger groups.

Form No. 1155

EMPLOYEE'S TRAINING RECORD

Name, *J............, F.* Age: *18* Clock No., *34*
Date Started, *3–11–19* Time Started: *8.__ A. M. P. M.* Rate: *$.57*

Former occupation: *Delivering bread after school hours.*
With what company: ——————
Has employee already been in company's employ: *No.*

Occupation	Department	Foreman	Rate	Length of Service	General Character of Service Rendered
Bench Lathe Operator.	*8-G*		*$.57*	*6–26–18*	*Good*

Reasons for taking training work: *To receive intensive training on special work.*
Date of Transfer from Training Branch: *5–12–19.* Occupation: *Bench Lathe Operator.*

Transferred to *8-G.* Department Foreman.......... Rate: *$.57*

TRAINING RECORD

Name of Part Worked On	Part No.	Operation	Machines Used	Rate of Production			Total Production
				Start of Training	Finish of Training	Average	
Bail Shifter Bearing Case...	4208-D	Turning	Bench Lathe	9 per day	15 per day	12	29
Step Bearing Holder........	4323-E	Turning	Bench Lathe	10 per day	45 per day	33	200
Upper Guide Bearing Case...	23033-D	Turning	Bench Lathe	10 per day	12 per day	11	29
West Suspension Lower Stems...	42674	Turning Drilling Reaming	Bench Lathe				125
East Suspension Lower Stems...	23175-B	Reaming	Bench Lathe				125

Note changes in methods or fixtures or special remarks: *On part No. 4323-E production and accuracy was increased through the use of a draw bar and spring collett instead of the step chuck ordinarily used in the factory.*

EMPLOYEE'S RATING DURING TRAINING
(95–100% Excellent) (85–95% Good) (70–85% Fair) (50–70% Poor)

Ability.....	*95*	Cleanliness .	*85*	Health.....	*95*	Intelligence.	*90*	Neatness...	*90*
Adaptability	*95*	Conduct....	*100*	Honesty....	*100*	Leadership..	*90*	Patience....	*95*
Attendance.	*100*	Disposition.	*95*	Initiative...	*90*	Loyalty....	*100*	Average....	*94*

Place additional remarks on other side.

Figure 42. Form for Training Record

Used by The Sperry Gyroscope Company. Courtesy of *Industrial Management.*

Inefficiency of Evening Classes

Evening classes for learning shop operations have not as a rule proved very successful. Evening classes maintained in schools away from the shipyards were conducted during 1917 and 1918, for certain shipbuilding trades such as riveting,

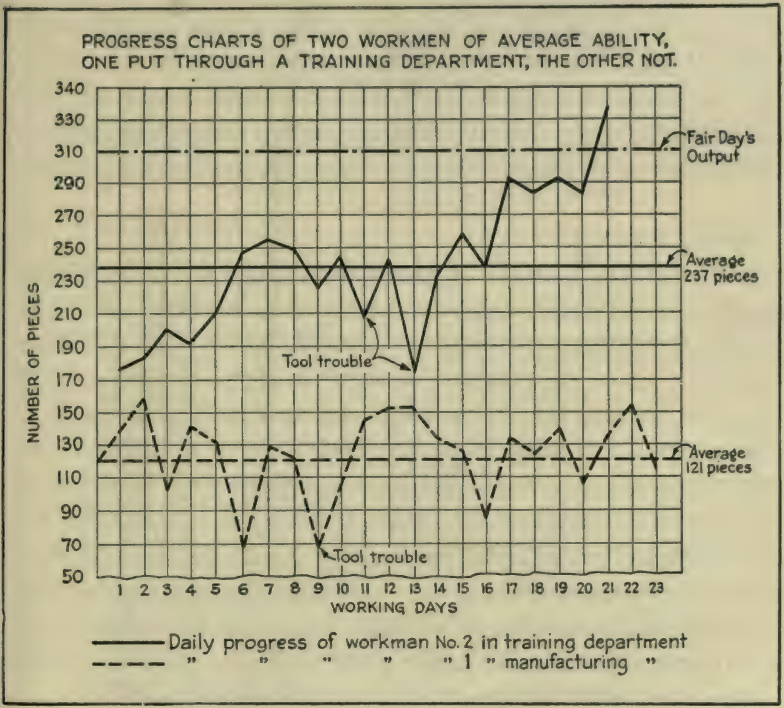

Figure 43. Diagram of Training by Upgrading Process
Chart No. 2, United States Training Service.

chipping and calking, and bolting up. Even with two or three hours' practice every evening, it was found that this form of training was wasteful and did not accomplish results that were at all comparable in efficiency to those attained by students working at productive tasks in the shipyards.

Necessity of Keeping Records

An essential adjunct of the administration of the vestibule school is a form of record which shows the daily or even hourly production of the student. When he can reach and maintain a certain standard, he is ready for promotion to a production department. Figure 42 shows the record used by the Sperry Gyroscope Company, while Figure 43 shows a simple form of record suggested by the United States Training Service of the Department of Labor. Such data kept over a period of years for all students will provide valuable information upon which changes in management can be based.

Training Instructors

Because the vestibule school is something of an educational innovation, it has created the need for an entirely new technique in training instructors. Experience in Massachusetts, extending over a period of several years in training trade teachers, as well as the accomplishments during the war in industries and trades of various kinds, serve to demonstrate that the best instructor is the person with several years' practical experience on the operations to be taught. He can acquire the necessary pedagogical training in much less time than it takes the experienced teacher to acquire the shop knowledge or skill. Training classes for instructors, on the other hand, have been most successfully conducted by persons of broad technical training and general industrial experience who were not of necessity fully conversant with all the details of the work which their students were to teach.

Many of the advantages of the vestibule plan may be retained and some of its disadvantages avoided, by using special instructors distributed among the departments who supervise beginners working at special machines or benches. The methods used by such instructors do not differ essentially from those in use in the vestibule school.

Improvement of Employees in Service

The limitations of the vestibule plan are such that any large establishment must expect to combine with it a number of other forms of training. The first necessary step appears to be to plan for inspectors or instructors who are responsible for the student's progress after he leaves the training section. Their functions are to make sure that he adjusts himself to the new environment and continues to make progress in skill and efficiency. Beyond this the problem of education for employees breaks up into a diversification of specialized classes and opportunities for improvement.

The Westinghouse Plan

As an illustration of the way in which this works out in practice, the plan of the educational department of the Westinghouse Electric and Manufacturing Company at East Pittsburgh, Pennsylvania, is given in outline.

1. Trade apprenticeship courses, each four years in length, are planned for draftsmen, pattern-makers, foundrymen, machinists, tool-makers, and electricians. Skill is acquired for the most part in each trade by working on materials and machines in the shops. A special department is conducted in the works for preliminary training, where practice is given in the more difficult operations before the apprentice enters the regular manufacturing sections.

A minimum of four hours per week during the entire course is devoted to classroom instruction. Classes meet in the educational department from 7 to 9 A.M. for the study of mechanical drawing and practical shop problems. Instruction in mechanical drawing includes blue-print reading, sketching, layout problems, and tool design; while shop problems include related English, mechanics, shop system, costs, and the applications of the principles of arithmetic, algebra, geometry, and trigonometry to shopwork. The student is expected to do

two hours' homework each week, in addition to the time spent in the classroom.

2. Graduate apprentices, as well as those who are still serving their terms, may be enrolled in the Casino Technical Night School, an institution under separate management but largely supported by the Westinghouse management. This school also draws a considerable number of students from all departments of the company, many of whom have received instruction at the plant in forms other than those afforded in the apprentice school. There are two main departments, one in engineering and the other giving preparatory courses leading to enrolment in the freshmen classes of the engineering course. Studies in the engineering department include laboratory work, lectures, and classroom exercises in physics, chemistry, metallurgy, theoretical electricity, applied electricity, power, and mechanics. The related courses in mathematics include algebra, geometry, and trigonometry, engineering and shop problems, and both conventional and applied design and mechanical drawing applied to construction work and engineering projects. Shopwork is given in pattern-making, foundry, and machine-shop. As a prerequisite to graduation, each student must prepare an engineering report which is criticized for its English. Those who need the instruction are required to take one term's work in business English.

The preparatory department gives instruction in shop arithmetic, business English, spelling, mechanical drawing, and hygiene. The night school also maintains a foreign department with a series of courses in Americanization and the elementary school branches for non-English-speaking employees.

3. The Westinghouse Club, located in Wilkinsburg, about half-way between the works and the city of Pittsburgh, is made up of male employees who meet for recreation, athletics, and study. During the fall and winter, lectures on various

subjects of general interest are given, and regular classes are conducted for the systematic study of the theory and design, and the application and sale of Westinghouse apparatus.

4. The company maintains a special one-year course for college graduates who may specialize in works management, sales, or engineering and design.

5. Students who have had two years of college preparation may take what is known as the Intermediate Apprentice Course, which is two years in length.

6. A special foreign students' course is maintained for those born abroad who expect to return to foreign countries as operators or salesmen of Westinghouse power and equipment.

7. Special lectures are given for executives and members of the clerical staff from 1:10 to 1:50 P.M. each day on subjects relative to the design and use of the articles manufactured by the company, the technical principles underlying shop practice, or the work of associated plants. Those who attend share half the expense of the lecture with the company, since the noon hour closes at 1:30.

8. The course offered by this company for production clerks is outlined on pages 184 and 185 of Chapter XI, "Training Minor Executives."

9. During the war, vestibule sections were maintained by the Westinghouse plant for machine tool operators, special electrical work, such as winding, insulation, and inspection, for tracing, detailing, and lettering, and for clerical and stenographic employees.

For an outline of similar work done by the Schenectady Plant of the General Electric Company, see Appendix C.

Co-operation with Public Schools

It is conceivable that certain forms of vestibule training or even courses for foremen and minor executives may be

given advantageously in school buildings near the plant. The greatest administrative obstacle to this kind of training in educational institutions is that continual fluctuations in the demand for labor make the schoolwork exceedingly irregular. Where the factory has a school of its own, instructors for certain kinds of operations can be kept busy at other work and the equipment can be used for routine production when there are no classes to teach. Similarly, instructors for small groups of minor executives or emergency squads can be drawn from operating or staff departments on a part-time basis. Co-operation between the school and the shop is possible and desirable to a much greater extent in giving related academic or technical instruction.

The work of first importance to public education is with working youths from 14 to 18 years of age. The indirect benefits accruing to industry from a continuation or part-time schooling which makes for better living and more intelligent citizenship are coming to be universally acknowledged by business men as well as educators. No program of shop instruction can carry students very far who lack a thorough grounding in the common school subjects and a working knowledge of science and shop mathematics. Continuation Education, on the other hand, must not be too academic, but must appeal to the student through instruction related to his work.

The age of the pupils and the character of their educational needs make the high school the ideal instructional center. It ought to be possible for pupils 15 to 18 years of age to enter employment with the feeling that their school hours are merely being changed. Their connection with educational activities ought never to be sharply severed. Industry should give them assistance in learning the rudiments of the new job; the school should take account of the new environment and help them to make the most of it.

Part-Time Employment for Students

A committee of the High School Masters' Club of Massachusetts reporting in March, 1919, distinguishes the following types of part-time employment for high school students:

1. Occasional types
   (a) Seasonal employment: Includes those pupils, principally members of the graduating class, who find positions open to them on condition that they leave school before the time of graduation. Also includes pupils needed in agricultural pursuits in the spring or fall.
   (b) Unrelated employment: Includes pupils at work during part of the day or week at tasks not directly related to the instruction received in school. The majority of this group are forced into employment for financial reasons.
   (c) Related optional employment: Includes pupils dismissed from some of their classes to do work closely connected with their studies. Clerical students may be assigned as office assistants to principals, or shop students may do repair work on school buildings. Similar work may be done in local commercial or industrial concerns.
   (d) Related required employment: Includes pupils whose school programs call for practical experience to supplement the theoretical instruction of the classroom. Assignments may be for vacations or only for a few weeks, or they may continue through the entire year.

2. Regular types
   (e) Alternating attendance and employment: This plan applies to pupils whose programs are arranged to allow alternating attendance—by weeks, days,

or half-days—in the school and in the shop or office.

(f) Continuation attendance: Includes employed minors who are obliged to spend a stipulated number of hours weekly in school.

With the exception of type (f), all of these forms of part-time education are now prevalent among high schools throughout the United States. Unfortunately, the predominant types are seasonal and unrelated employment. If the secondary school is to make the most of its opportunity, it must increase the number of pupils, especially among graduate students and those in the third and fourth years, who find an appreciable part of their school instruction closely related to their occupations. Of course, a large share of the responsibility for a working plan rests with employers; the school cannot accomplish much alone.

Whether or not the high school should take over nearly all continuation and part-time education cannot yet be answered for the country at large. Highly desirable as such an arrangement may appear in theory, there are often local or personal circumstances which make it injudicious.

Urgency of Present Situation

The present situation is so urgent that industries must launch their training plans at once, regardless of what the schools may ultimately find it possible to do. It is therefore essential that every industrial enterprise appraise the local educational institutions and endeavor, possibly in some such manner as suggested by the outline of the General Electric Company's work at Schenectady, to help its employees and instructional staff to make good use of them.

CHAPTER XI

TRAINING MINOR EXECUTIVES

Planning for Transfers and Promotion

One of the fundamental problems in management is that of provision for continuity in the life of the organization. Even in peace times, there are numerous factors operating to bring about changes in personnel and in policies. The varying ambitions and abilities of the working force are causes working all the time to disturb the existing arrangements, and give rise to readjustments in positions and methods of management. Real progress is possible only when transfers and promotions are made in such a way as to bring well-trained and naturally qualified persons into executive positions. The preparation of minor executives has been neglected, as a rule, even in companies which have stressed the matter of the careful initial selection of employees.

W. H. McElwain Company—Training Plan

The W. H. McElwain Company of Manchester, New Hampshire, believes that one of the greatest enemies to growth is the person who looks with contempt or disdain upon the ability of his followers to grow. One of the essential qualifications for the heads of large departments in their shoe factories is the ability to train and develop men.

The company believes that the open door to advancement is one of the most powerful incentives before the workers in any industrial enterprise. But they also realize that no one can pass through this open door unless he is properly prepared.

The Situation Outlined

W. L. Shaw, head of the planning division in this company's central plant at Manchester, outlines the situation as follows:

> The question of the absorption of new workers into an organization seems to me obviously one of the most important problems. I cannot see how any concern can survive permanently unless it constantly gives a great deal of thought to preparation for the future.
>
> If you take a young person who has had a very good general education and put him into a large organization, is it not very clear that the sooner you can give him some clear conceptions of how your concern is organized and what your policies and methods are, the quicker he is going to fall into line? And as soon as he has absorbed the technical details he is going to do better work and be much less likely to make errors which may cause trouble.
>
> In taking a new member into an organization a large part of the first week or two is usually absorbed in developing acquaintanceship with other individuals. As Mr. McElwain used to say, "It will take a month or so to let the new things soak in." The head of the instruction department which we have lately installed speeds up this process of introduction and "soaking in," instead of leaving it to be a matter of accident, depending largely upon the personality of the individual as to whether he does or does not become acquainted with the new surroundings.
>
> We first became interested in this phase of training in connection with job analysis. When we took up time-study work we first thought that we would permit well-qualified workmen to be time-study men. This was a failure; they could not do it. We should first have had to give them courses in physics as well as arithmetic and other mathematics. After trying several men from the shops, we had to give up the idea.
>
> We next tried several graduates from technical colleges, but they proved equally hard to handle. They were unpopular with the workmen, and were continually causing trouble because of their lack of sympathy with the worker's

point of view, or because they did not understand our methods or policies. Finally, after watching their work, we concluded that the fundamental difficulty lay in certain essential matters which to us seemed obvious in our daily work.

Gathering Information

Under the direction of the planning department, a man was then detailed to spend several months in collecting material which could be made the basis for training time-study men, technical persons for certain factory departments, and both men and women for the planning and employment departments. It became evident from the start that it would be almost an endless task to prepare all the instruction material in detailed form, so a loose-leaf syllabus, merely a check list of topics, was hit upon as the most desirable substitute. This plan made it possible to add material from time to time as regulations were changed, or as additional charts or illustrative material were prepared. The following paragraphs are taken in part from the introduction to the syllabus:

A few statements are necessary in order to give one a clear idea of this binder. In the first place it is not a text-book, but is a reference book for the instructor to use. To be sure, several parts of the book are given to the apprentice, such as the check lists, detailed instructions for time-study practice, etc., but these are given separately. The idea was primarily to collect all the written data used in the course, and to put them in one place in usable form. In this way it was possible to simplify the instruction work, and put it in such form that another person could take up the instruction work without serious delay.

The detailed factory check lists are complete for all factories, and are the best thing we know of for making sure that a man will get detailed knowledge of whatever particular department he will specialize in later. For example, if Mr. Brown wishes a man trained for upper leather work, that man will be given the check lists on upper leather and upper leather tannery to study, after completing the regular course. The man will take these check lists into the factories and will get all the information asked for in the

items. When Mr. Brown gets the man, he can put him to work, knowing that he is prepared for it.

No one person gets all the course. The writer is of the opinion that the work of the planning department will grow into the lines of investigation and research, rather than toward mere time-study work, and that to accomplish this, it will be necessary to have men who have a general knowledge of the whole business, and who have in addition a very detailed knowledge of some particular factory or department. We are trying to work along these lines now, and we believe that the department will be in a stronger position when we have in our organization a man who understands thoroughly each department of the business. This, however, will not narrow the men by too extreme specialization. As the first step toward this tentative plan, each man gets one or two of the detailed check lists and no more.

It is understood, of course, that the material included in the syllabus does not indicate the amount of actual "Laboratory" work done in the course. It is the plan to have each man get considerable working experience by doing layout work, process reports, findings tests, and time studies, while still under the supervision of the instructor. Whenever possible, such work is requested from the planning department managers and therefore time is not wasted in theoretical field work. As this work varies daily, it is obviously impossible to line up specific items to be done by the apprentices.

Subjects in the Training Course

The outline of the subjects covered by the training course is given below. Starred topics are taken up only by persons specially selected to do the work indicated. Thus the slide-rule instruction (topic No. 11) is usually given only to clerks or others who are required to make use of the slide-rule in their daily work. A chart and condensed instructions regarding the use of the slide rule are provided with the thought of giving special help in multiplication and division. Similarly the section on the "Theory of Employment and Labor Conditions" (topic No. 18) is given in detail only to persons who are likely to enter the employment department. The period of instruction usually lasts from one to three weeks, according to the range of subjects to be covered, the position for which the apprentice is being fitted, and the size of the class taking the course.

INSTRUCTION COURSE: OUTLINE OF SUBJECTS COVERED

A. Office and classroom:

1. Instruction system.	Purpose and explanation of.
2. W. H. McElwain Company.	History and organization.
3. Planning department.	Organization, functions, and routine.
4. Foreman's instruction book.	Knowledge of contents.
5. Company system.	Relation: Supply and shoe factories' sheet system, delivery calendars' tag system, abbreviation catalogue.
6. Order department.	System used.
7. Fundamental ideas on which our work is based.	
8. Personality.	
9. Individual system and technique.	
10. Tact and psychology.	
*11. Slide-rule.	Theory and practice.
*12. Elements of time-study practice.	Theory and practice.
*13. Findings tests and layout work.	Theory and practice work.
14. Preliminary instruction on shoe manufacturing.	Parts, methods of construction.
15. Elements of report-making.	Forms.
*16. Drawing.	Free-hand. Mechanical. Diagrams. Graphic representation.
17. Theory of organization and management.	
*18. Theory of employment and labor conditions.	

B. Fieldwork

Shoe factory men.	Supply factory men.
Shoe factory visits, technical.	Shoe factory visits, general.
Supply factory visits, general.	Shoe factory visits, technical.
Laboratory practice: stitching, lasting, making, finish, or tree.	Laboratory practice: tannery, upper-leather, cloth, general; or sole leather, heel, general.
Criticism and correction of work.	Criticism and correction of work.

C. Follow-up: Talks with the man and with his manager, to keep track of work done, and to gather additional material for instruction wherever that is found to be necessary. It may be necessary to extend it over a period of two or three months, depending upon the employee's success.

Methods of Instruction

1. Charts

The course was first given by the man who had collected the material. In the process of his investigation, he had gathered a large fund of illustrations drawn from the experience of members of the company which could be used to advantage in teaching each topic. Organization charts, diagrams of machines and operations, and supplementary material from recent publications were also made a part of the subject matter.

2. Exhibits

To help the student in getting the first conceptions of the materials and methods involved in shoe manufacture, a small museum was prepared containing a series of exhibits dealing with each of the more important sections of the industry. The collection includes samples of various kinds of leather, shoes in every stage of construction, machine parts, and charts and diagrams of different processes. With such an exhibit at hand, it is relatively easy to explain the sources and uses of the different materials used in shoes, how the shoe is constructed, or the relative advantages and

disadvantages of the welt and McKay processes. Explanations in workrooms are not always satisfactory, owing to the noise, and protracted discussion is not desirable since it is likely to interfere with the regular routine of the shop. Through the use of the exhibit, the student becomes acquainted with the more elementary phases of shoe manufacture before entering the plant on an instructional visit and his time can be spent to much better advantage.

3. Visits to Factory

As the outline suggests, visits to various parts of the shoe factory, or to the factories manufacturing supplies, constitute an important section of the course. Each visit is made with certain definite objects in mind, and the student has at hand a list of matters to which he must devote his attention.

4. Use of Library

The instruction department also contains the plant library, dealing with such topics as scientific management, industrial organization, business systems, employment management, and other subjects of interest to executives and progressive workmen. The head of the department is expected to keep in touch with important additions to the literature of these fields and to assist the members of the organization in finding books or articles bearing upon their immediate problems.

At present, the instruction is being given very successfully by a young woman, a college graduate, who studied the course and various departments of the plant in an intensive manner for some months.

The Purpose of the Check List Sheets

An examination of the sample sheets from the check list, reproduced herewith, will show that many of the points considered are of the kind about which the employee in most concerns either receives no instruction, or is expected to gather his information in haphazard ways. The sheet on "Company System" suggests a variety of problems which are sure to confront any executive, even in a minor position, and concerning which he should be thoroughly intelligent if he is to

render efficient service. This sheet is only one of several in the binder, all devoted to the general subject of the organization and system of the company.

Training in Personal Technique

Much attention is given to matters of personality and individual system and technique. A pointed warning for the new employee is contained in such topics as "talking for personal effect: statements which may be taken by other members of the organization as a direct or indirect 'attempt to climb' "; "bubbling talk"; "constructive versus destructive criticism"; "definite plans for utilizing spare time"; "discussion of company's plans with outsiders"; "acknowledgment of the plans of other employees."

A frank discussion of such questions with a capable instructor saves many young men and women from needless blunders. Furthermore, criticisms and discipline are rendered much more effective when the one at fault can be confronted with the fact that he has been properly instructed and given fair warning.

Psychology of Specific Approach

Each student learns something of the "psychology of specific approach." If he has matters to bring before an executive, or a report to make, he is taught how to organize his material and learns something of the knack of gaining concentrated attention by holding himself strictly to the topics in hand.

Such a system of training renders distinct vocational guidance service to the employment department. As a rule, those who are enrolled for the general course are not told what department they are being prepared for until the work is completed. This gives opportunity for a period of observa-

tion of the students by the instructor and members of the planning and employment departments, who are thus in a position to place the candidates to better advantage.

The Final Examination

The only feature of the course open to serious question in point of method arises in this connection. A written examination lasting about four hours is given at the end of the course. It is intended to serve as a further gauge of the apprentice's adaptability and of his readiness to undertake any particular responsibility. The claim is made that unsatisfactory candidates thus have an opportunity to prove their inefficiency before they are assigned to important positions and they can be dropped from the department at once instead of after four or five weeks of unsatisfactory work. Several objections may be urged to such an examination. Many very capable persons write a poor examination paper, especially under conditions such as would obtain here where the candidate's means of livelihood are more or less at stake. Shorter examinations at intervals, written reports on selected topics, personal conferences, the preparation of a note-book, and other means which will suggest themselves at once to any instructor would probably answer the purpose equally well and at the same time relieve the apprentice of the strain of facing a "final examination."

Records of Graduates

One naturally looks to the records of its graduates as the acid test of a school's efficiency. The statement is made by the department that has this work in charge at the W. H. McElwain Company that the progress of employees who have taken these instruction courses, now numbering nearly 100, is on the average twice as fast as in the case of those who

entered the organization without any preliminary training. No better proof of successful accomplishment could be asked.

Westinghouse Work with Production Clerks

The Westinghouse Electric and Manufacturing Company of East Pittsburgh, Pennsylvania, has adopted a method for training production clerks which in several respects closely resembles the training for minor executives described above. The company employs in all nearly 20,000 people, and in addition to the large works at East Pittsburgh it has several other plants in various parts of the United States. So large an enterprise involves a correspondingly large amount of clerical labor in handling production. Nearly 500 clerks are employed in the production department alone. Some definite plan became necessary for training them in departmental routine since the labor turnover was so large as to cause a number of changes. As instructor a man was selected who had been for eighteen years connected with various kinds of clerical and executive work in the factory. He was thoroughly familiar with every department and was well grounded in the details of the management of this particular division. With the help of other members of the instruction department he drew up a plan of training which made provisions for forty-eight lessons, each lesson to be two hours in length. The present plan is to bring together groups of ten to fifteen persons from the department at convenient times during the day, each group receiving two lessons each week.

Course of Study

As outlined, the course includes the following subjects:

1. A brief study of the booklet given by the company to each new employee, to make sure that all are familiar with the general rules and that they have

in mind certain facts relative to the company which ought to be common knowledge.

2. The geography of the plant, taught by means of maps and visits to departments. Especial attention is given to the routing and distribution of material. Some consideration is given to the location and the work done by other plants owned by the same company.
3. Company organization, showing the number and nature of the different executive officers and the relations existing between departments.
4. A study of a chart showing the path of orders filled by the production department.
5. Standard sizes for all stock in common use, supplemented by an explanation of the necessity for keeping in touch with the division of standards, which makes a constant review of standard sizes.
6. Standard abbreviations. Their use is taught by means of sentences, dictation, and other practical methods in order to familiarize the student gradually with their use.
7. Detailed location of subdepartments, with the path taken by materials from and to these departments.
8. Visits to departments and storerooms, accompanied by a study of the forms in use with reference to each of them. Some time is spent in studying the location and phone numbers of the different storerooms for purposes of ready reference.
9. A detailed examination of all forms and blanks in use by the production department, with detailed instructions regarding the use of each one and the errors to which they are subject.

One of the principal objects of this course is to make possible a flexible organization. Clerks must become resource-

ful in getting information from every possible source and must be sufficiently well trained to be ready for transfer to other work in case of promotion or emergency calls.

Adaptability of These Plans

The principles involved in both of the instruction schemes described above have direct applications to concerns of every kind, and the methods in use are sufficiently flexible to permit their ready adaptation to any kind of work or to any type of organization. Written specifications for hiring, job analyses, written standard procedures, accident reports, organization charts, together with a variety of other material, are already available in many concerns as a basis for instruction.

Selection of Instructors

The results of the work in the W. H. McElwain Company show quite clearly that organizing and teaching ability are required in the instructor rather than extensive technical experience. The technical part of the instruction is supplemented by contact with the shops and is furnished in part by foremen and others who are experts in their respective fields. These considerations appear to decrease considerably the difficulty which most firms are likely to anticipate in finding persons who are capable of managing a training course for minor executives. In many respects the problem appears to be somewhat simpler than that of obtaining instructors to train workmen or operatives where technical trade knowledge and skill, usually the product only of long experience, must be combined with teaching ability.

The administrative problems connected with instruction at the Westinghouse plant are somewhat different in that a more thorough technical knowledge is required in the in-

structor. In either case expert training in dealing with educational matters is required at the outset in collecting the material, in arranging it for teaching purposes, and in devising the methods of instruction. The person brought in from the plant to do this kind of work usually fails because he does not have at his command a technique of class management and does not appreciate the several steps which must be taken by the learner. On this account it appears that there exists here, as in other departments of industrial training, a distinct field of service for state and federal education authorities, or for departments of education connected with universities, in training instructors. The methods by which this can best be accomplished are fully discussed in Chapter XIX.

Small Classes and Practical Topics

There are two essential conditions for successful extension work of this type with minor executives or foremen. One is that it be done for the most part in small groups, substituting problems and discussion for lectures. The other grows out of the first. There is need for the collection of a fund of problems, drawn from the company's experience, which will replace in large measure instruction through formal lectures or by means of problems drawn from sources which make them unreal or uninteresting to the student. Data of the sort desired are relatively easy to secure for mathematics, drawing, mechanics, or shop operations, but are always more difficult to formulate for management classes, foremen's courses, or office employees.

Discussion of Problems in Management

As an example of what needs to be done, a suggestion recently made by the author to a representative of a New York manufacturing plant may be cited. It appeared that

the company was not concerned with organizing classes of the common type for training operatives, but was deeply interested in acquainting a large group of young persons, who had recently come into positions of minor executive responsibility, with the points of view and experience of the older members of the organization and with the fundamental policies of the company. Among the methods of accomplishing this aim through the use of problems and group discussion which suggested themselves, in the course of the conversation, was the following. During the war, the principle of wage payment based upon the use of index numbers was adopted by the company. Each employee receives each week an extra envelope marked "High Cost of Living." The envelope contains a sum of money added to his earnings, the amount of which depends upon the current variation, above a basic standard, of the cost-of-living index numbers published by Bradstreet. Many of the young executives in question, it was safe to assume, had only a hazy conception of the methods of computing index numbers or of the exact use made of them by the company. The suggestion was made accordingly that the group should be set to investigating this matter. The study of several forms of index numbers, with the computation, perhaps, of an index for the local prices of various commodities, and the effort to work out a problem or two illustrating the paymaster's actual computations for the "High Cost of Living" envelopes—together with the discussion which would naturally grow out of this study—would lead, obviously, to a much better understanding of the wage policies of the company.

The Problem Briefly Stated

Scientific management has failed to make as good progress as it should because no technique has been evolved for training the non-commissioned officers who must translate company

policies and standard practice into action. The stability and continuity of any organization depends upon the continual advancement of well-qualified persons to responsible executive positions.

Training for minor executives is intended to help solve these problems. It depends upon research which will supply from the company's daily routine and accumulated experience the specific problems and exact data upon which instruction can be based.

CHAPTER XII

THE FOREMAN'S TRAINING

Evolution of the Foreman

Nearly every important change which has appeared in the organization and management of industrial establishments has brought changes in the position and the duties of the foreman. The first foremen were master craftsmen who exercised some supervision over unskilled laborers and over the workmen and apprentices who performed routine tasks. In time, as the shop grew larger the master-craftsman became a superintendent and his former duty of immediate direction of the work devolved upon several foremen, each exercising authority. Continued growth made it necessary to centralize certain kinds of work in the hands of specialists, and the powers of the foreman began to be contracted. As more machinery was used, a mechanical department was created to operate the power plant, install new equipment, and make repairs and alterations. Increased output called for a specialist in marketing and another in purchasing. With large capitalization and corporate ownership, the auditor and treasurer appeared. With financial control taken away from the superintendent the activities of the foremen were still further narrowed.

As the activities of the plant came to be limited to a special line, and as the advantages of standardization in equipment and in sizes and styles of product became apparent, designing and drafting rooms and finally chemical laboratories were added, thus taking from the foreman control over the design of his product and the methods of manufacture. Scientific management concentrated the scheduling functions

in a planning department; it standardized operations and methods with little direct assistance from the foremen, and gave impetus to the general tendency to establish specialized departments such as those for time-keeping, the storage and issue of stock, cost accounting, inspection, and correspondence. More recently the movements for establishing employment departments and corporation schools have taken still other functions out of the foreman's control.

Survival of Old Type

In spite of these strong tendencies to reduce the number of the duties discharged by foremen, many plants remain to which the following description, taken from "The Administration of Industrial Enterprises," by Edward D. Jones, still applies:

> In ordinary practice there is but one foreman to a shop. This man is expected to look after tools and machines, find materials and supplies for his men, instruct them in the manner of doing work, arrange tasks so that everyone is kept busy, enforce a proper pace, write up the job cards and other records, preserve order, make reports as requested concerning the progress of individual jobs, inspect work for quality, lend a hand in repairs, suggest improvements in equipment, and give an opinion on which to base promotions and discharges. This is a tremendous range of functions, and it is not surprising that many responsibilities of an administrative character slip from the overloaded shoulders of the foreman, and fall upon the workman. Hence the general demand for "experienced" workmen; a demand which means that men are wanted who can take care of themselves and not bother the foreman.

Functional Foremanship

A critical examination of the obvious difficulties presented by the foregoing description has led to the recommendation by several leaders in scientific management that firms establish

groups of staff executives to whom a large number of the foreman's functions are to be delegated. A few concerns have adopted a scheme which calls for eight persons, four who serve as clerks in a planning room and four who act as bosses in the shop. The work performed by the four clerks may be outlined as follows:

1. The "order of work clerk," or "routine clerk" schedules the work, determining the order in which jobs come to each machine or production center.

2. The "instruction card clerk" has charge of all shop orders. These include standard instructions, lists of materials, records of standard times, and other memoranda necessary for the use of the "teacher" or "gang boss."

3. The "cost and time clerk" prepares a report on time and material and allots these to the several jobs, workmen, and shops, such records being used by the pay-roll and cost accounting departments.

4. The "shop disciplinarian" maintains personnel records upon which transfers, promotions, suspensions, and discharges may be based.

The duties divided among the four shop bosses are as follows:

1. The "machine speed boss" keeps the progress of production up to the limits set by the speeds indicated on the instruction cards. His principal function is not to speed up the workmen but to repair and change machines in such a way as to maintain efficient working speeds. He must be able to assist the shop teachers in helping workmen to become proficient in the safe operation of high-speed machines.

2. The "inspector" is charged with the examination of the quality of the output.

3. The "repair boss" has charge of alterations or repairs in machinery or equipment.

4. The "teacher" or "gang boss" takes the place of the

old foreman now relieved of many duties and transformed into a specialist. The duties are to see that each man is provided with work, that he has the right equipment, understands instructions, and performs his work properly.[1]

Present Practice

So complete a separation of functions is not common in present-day industrial practice. In most shops under scientific management it is customary to find a planning department with other staff experts who perform for a number of departments the duties suggested above for functional foremen. In a few cases from two to three specialists are to be found in one department or shop. The Dennison Manufacturing Company, for example, has proposed that three foremen be placed in each department, one to have charge of mechanical equipment, another to have control of production, planning, and time and cost records, and the third to represent the employment department in maintaining personnel records and giving instruction to new employees. In working out this plan the company proposes to examine the records of all of their present foremen and assign them according to natural ability and past achievement to one or the other of the three positions outlined. Several departments will be consolidated as the new leaders are assigned, thus making it unnecessary to increase the total number of foremen.

It is quite common to find plants decreasing the number of workmen in charge of a single foreman, or adding gang leaders, supervisors, inspectors, or leading men who have charge of small groups of operatives. This of course makes it easier for the foreman to give instruction to new employees and to see that revisions of standard practice are put into execution.

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[1] For a full discussion of the principles and methods involved, see Kimball's "Modern Principles of Industrial Organization," pages 96-109; Jones's "Administration of Industrial Enterprises," pages 156-162.

W. H. McElwain Company Work With Foremen

The W. H. McElwain Company believes that one of the chief causes for failure in management is found in the improper or incomplete training of foremen or assistant foremen. After organizing employment and planning departments, this company discovered that troubles still arose because the departmental foremen could not always be depended upon to elaborate company policy into the details of daily work. The following steps were taken to make easier the transmission of standard practice and new policies to minor executives and workmen, as well as to improve shop morale and productive efficiency:

1. The number of departments in the factory was reduced from ten to four.

2. Foremen for the newer and larger departments were selected with care in order to secure a high type of executive. This enabled the firm to handle its employees through "big leaders" rather than through "bosses."

3. Under each department manager was placed an executive foreman who devotes his entire time to administrative detail.

4. Under the general supervision of the department head and the detailed control of the executive foreman was placed a carefully trained and selected force of assistants called "the rated elastic staff." Members of this staff spent part of their time on non-productive labor and the remainder as instructors, inspectors, assistants, supervisors, machinists, or substitute operators. The staff may be regarded as a group of assistants with an enlarged repertoire who are subject to special assignments. This method replaces the older plan of having a few assistants who spend their entire time on non-productive work. It has not been possible to introduce this phase of the plan except in a few departments, but in these it is being developed along experimental lines.

5. Employees for the elastic staff are carefully selected and trained to become all-round operators on a number of different machines.

6. The entire staff is brought into frequent conferences. Its members attend foremen's dinners and discussions, and are gradually being educated in other ways not only to become good workmen but also to be intelligent and efficient in co-operating with the department head and the executive foreman in improving the technique of handling operatives in the department. Foremen's meetings have been greatly enlarged in scope and are held frequently.

7. The new foreman, or department head, is expected to spend the greater part of his time and thought on the problems of technical planning and the development of individual employees, thus leaving for the executive foreman the carrying out of the administrative detail of the department according to the schedule of the planning staff.

Functions of a Foreman

1. *Connecting Link.* An increase in staff control is likely to result in a demand for better foremen. As the amount of expert advice multiplies and as standardized methods come into more common use, the need increases for leaders on the firing line who can interpret instructions to the workmen and who can assist staff officers in collecting the information upon which their work must be based. The employment manager must get most of his knowledge of current problems within the plant from the foreman. It is through the foreman, moreover, that the employment manager must work in order to get his policies introduced into the plant.

2. *Conserver of Men.* The success of almost any movement intended to benefit the workman lies in the hands of department heads and foremen. Illustrations are to be found in the experience of every concern. According to an un-

published survey made by the Harvard Bureau of Vocational Guidance, an analysis of the number of infections occurring among the accidents reported in a manufacturing plant revealed the fact that infection occurred in eight cases out of every hundred treated by the medical department. In comparison with the records of other companies where infections have been reduced to a fraction of one per cent, this was an extremely bad showing. When causes were sought, it was found that the foremen, largely because of their ignorance of hygienic principles, failed to back up the order issued by the superintendent that every man suffering even a slight injury was to be sent at once to the plant hospital for first-aid treatment. Instead of insisting that the men report at once to the nurse, several foremen were advising them to wait until noon or until the close of the day in order to avoid lost time in the department. An examination of the accident cases for the same plant showed that an abnormally large number occurred among employees who had been at work only a few hours or a few days. The safety instruction which should have been given the new employee by the foremen or leading men was plainly being neglected. In another plant the mutual benefit plan was not a success because the foremen, not being fully acquainted with its provisions, were making no effort to encourage employees to take out insurance.

Here are clear cases showing the need for enlightened leadership, which not only energizes the working force and secures teamwork in production, but which likewise helps in promoting every activity in which the employees have a part.

3. *Master-Craftsman.* In the great majority of shops the foreman must remain the master-craftsman with reference to the technique of production. He is still the planning expert for his section and is in direct charge of the schedule of work. He is not infrequently the inspector of quality and must also have a large part in the education of new employees and the

progressive improvement of his stable group of workers. If improvement is to come, it must be sought in the direction of training foremen for their tasks rather than by delegating their duties to other individuals.

Problem of Improvement

What is needed now is a re-examination of the foremen's duties from two points of view:

1. What burdens should be shifted from his shoulders to staff executives or to the representatives of a service or employment department?

2. Now that his functions have been reduced to a minimum, what constitutes good practice in the discharge of his duties and how can he be trained to perform them?

Material for training purposes will be found only by patient, thorough investigation of the two worlds between which the foreman stands. He presides directly over the world of work, the field of craftsmanship, but he represents and interprets to his men the world of administration, the field of executive control. He must have a knowledge of both and in addition a broad foundation in the social and psychological principles involved in dealing with men.

Technical Training—Lowell Institute

Only a few public or private institutions have endeavored to set up courses specifically designed for the training of foremen. The Lowell Institute is a school for industrial foremen conducted under the auspices of the Massachusetts Institute of Technology. The school is intended to bring the systematic study of applied science within the reach of young men engaged in industrial pursuits, who wish to prepare themselves for higher positions but who are unable to attend college courses during the day. Three courses, each two years in length, are offered—mechanical, electrical, and a buildings

course. Instruction is given by means of recitations, lectures, drafting-room practice, and laboratory exercises. The instructing staff is composed of members of the faculty of the Massachusetts Institute of Technology. Applicants for admission must be at least 18 years of age and must pass satisfactory entrance examinations in arithmetic, elementary algebra, geometry, and mechanical drawing. A preparatory course for those who have not the proper entrance qualifications is maintained by the Franklin Union in Boston.

Athough the courses are well attended, a review of the subjects offered and of the methods in use shows that the instruction is largely theoretical, that it is not applied directly to the work done by students, and that it is nothing more than a good foundation in mathematics, applied science, drawing, and shopwork for a limited number of industries.

Carnegie School of Applied Industries

At the Carnegie Institute of Technology in Pittsburgh, the School of Applied Industries offers somewhat similar preparatory day and evening classes for foremen. As in the case of the Lowell Institute, however, instruction is not applied to the diverse interests represented by the industrial life of Pittsburgh and the management aspects of foremanship are neglected. These courses play an important part in preparing for later promotion, but do not fill the need for specialized training.

"Flying Squadron"—Goodyear Company

Several large firms have made an effort to train their own foremen on the technical side by offering experience in several departments of the concern to persons having satisfactory educational qualifications and good native ability. The "flying squadron" plan of the Goodyear Tire and Rubber Company of Akron, Ohio, affords an excellent illustration.

Each squadron is composed of 50 men picked from the various departments of the company or especially selected from new applicants. After passing strict physical and mental examinations they sign an agreement to pursue a three-year course which leads to the degree of Master Rubber Worker. Classes meet for two hours once each week, for forty weeks each year. Part of the instruction is offered to small groups but as a rule from 50 to 200 men meet for lectures and discussions. At present there are three different kinds of squadrons fitting men for production, engineering, and inspection.

The production squadron allows each man during the three-year course opportunity to work in every production department and in addition to attend school six hours each week. He studies English, arithmetic, economics, organization and management, and rubber manufacturing practice. Optional courses are offered in mechanical drawing, Spanish, and modern business methods.

The engineering department squadrons are organized in the same way save that the men are recruited from the machine-shops and the engineering departments and the school work given them embraces shop mathematics, mechanical drawing, and the principles of mechanics.

An inspector in the Goodyear Company is an executive officer having charge of a small group of workmen. In many respects his functions are really those of a foreman or sub-foreman. Inspectors enrolled in the flying squadrons study the following topics: mathematics, business English (including Goodyear standard practice in correspondence), rubber manufacture, charts and reports, department routine, department operation, costs, and mechanical drawing.

Goodyear Special Training Course

In the same plant a special training class is maintained which in March, 1919, enrolled some 350 foremen. The class

meets for one hour, from 4 to 5 P.M. on Mondays, Wednesdays, and Fridays. Three sections are made, consisting respectively of college graduates, high school students, and those having a grammar school education or less. No use is made of these divisions except for purposes of assigning problems and giving examinations. The entire group listens to the same lectures. In addition to the foremen, division heads, executives from staff departments, and junior executives of the organization may attend. Lectures are given by practical men from the several departments, in which they outline the work done under their supervision. Experts who lecture on various technical subjects are brought in from the outside at the expense of the education department. The following outline shows the work as laid out for a two-year course.

Course in Production for Foremen

First Year

Department Management
1. Charts
2. Reports
3. Department operation

Mathematics
1. Arithmetic
2. Algebra (special class Tuesday and Thursday)
3. Trigonometry
4. Calculus

Materials
1. Crude rubber
2. Cotton
3. Compounding materials

Weekly Lectures
1. By best business talent available (series of six lectures on personnel by man from labor department)

Library
1. Book reviews
2. Reading courses
3. Current events

Recreation
1. Gymnasium
2. Games
3. Pow-wow

Guidance
1. Consultation
2. Development records

SECOND YEAR

Manufacture
1. History of manufacture
2. General processes
3. Products

Recreation
1. Gymnasium
2. Games
3. Pow-wow

Costs
1. Fundamentals
2. Details

Library
1. Book reviews
2. Reading courses
3. Current events

Organization
1. Analysis, supervision
2. Functions of manager and subexecutives
3. Human factors
4. Initiative and advancement

Guidance
1. Consultation
2. Development records

Firestone Training Class

At the Firestone Tire and Rubber Company a number of college men are enrolled in an executives' training class. The course lasts for a period of eight months. Each member of the class studies the operations involved in manufacture beginning with the treatment of crude rubber. Upon his completion of the work in any department, he is given a written examination on what he has done, a feature of which is that he is required to set down his suggestions in regard to the management of the department, stating in detail what changes he would make if he were given the opportunity to supervise it. The group meets once each week for a discussion of the work in which they are engaged and for theoretical discussions of the rubber business. It is expected that students will absorb the policies of the company through contact with the executives. Very little attention is given, therefore, to this topic in formal lectures or class exercises.

Packard Service School

The Packard Motor Car Company of Detroit has planned courses for training technical men, assistant technical men or department foremen, which are conducted by the service school under the control of their technical service department. Classes and lectures are conducted by a supervisor of instruction and students are assigned to various factory departments for practical experience that must be gained by immediate contact with the shop. For the six months' course, some one of the following qualifications is necessary:

1. Mechanical engineer with automobile experience.
2. Technical man, service man, or mechanic with one or more years' experience directing, supervising, or otherwise handling general car service or truck service or both.
3. Mechanic with two or more years' experience on Packard cars and trucks, and machine-shop experience.
4. Man with business experience and two or more years' general motor car mechanical experience.

A longer course is offered for men who have had considerable mechanical experience and only slight supervisory experience or who have had a substantial business experience but only slight mechanical and technical experience. The requirements for the one-year course are as follows:

1. Mechanical engineer with no automobile experience.
2. Mechanic with one or more years' experience on Packard cars and trucks.
3. Man with business experience and one or more years' experience on cars and trucks.
4. Man with experience in factory work and business experience in addition.

The Foremen's Meeting

It is apparent that the courses outlined above lay stress upon the technical aspect of the foreman's work to the neglect of other significant duties. Several plans have been devised to meet this specific need. One of the simplest of these is the foremen's meeting. Some of the questions which may arise in a foremen's meeting are discussed in Chapter XVII. Safety, wages, labor turnover, the employees' benefit association, recreation—in fact any of the practical questions confronting the employment or instruction departments may well be brought up at the foremen's meeting with two points in view; first, to get the contribution of the individual foremen to the solution of problems, and second, to inform them fully as to the best procedure in regulating their own action with respect to the matter under consideration.

The inauguration of an employment department or of an educational program may necessitate bringing the foremen together for a special series of conferences and discussions. Thus in New Jersey two companies co-operated with the state board of education just before the armistice was signed in giving instruction to their foremen with regard to the plans and methods to be used in the new departments being installed under government supervision for the training of their employees.

Questions for Foremen's Meeting

The foremen's meeting can be made much more valuable by giving to each man an outline of the material to be presented and of the questions to be raised for discussion, several days before the meeting is called. The following outline taken from the Dennison Manufacturing Company's records includes the questions raised at one of their foremen's meetings.

Questions for Foremen's Meeting, Thursday Evening, August 2

1. What should be done with the employee who is valuable on his job but who is a habitual drinker?
2. What should be done with the employee who is unsteady and who never explains absence until he returns?
3. How should an employee be approached when it is necessary to have him work on other than his regular work, whether in his own or another department? Should the employee be informed how long he will be on the new work and what his wages will be?
4. On what will an employee's rate of wages in a new position depend?
5. What action should foremen take when approached by an employee regarding some general condition under which he is working, that is, heat, light, ventilation, etc.?
6. How should foremen handle requests for pay increases?
7. When an employee is absent on account of sickness or accident, and the foreman finds that the employee temporarily placed on the job of the absent employee is superior to the regular man, should the regular employee be reinstated when he is ready to resume work?
8. Should an employee ever be reprimanded in public for breaking a rule or committing an error?
9. If an employee is not put on the job for which he is hired but there is other work available in the department, what should be the procedure?
10. When an employee asks to have his work changed for the sake of his health, what should be the procedure?
11. Is it advisable ever to change employees to jobs they don't like merely for discipline?
12. When an employee is held on timework pending the determination of new piece rates, should any changes be made in the time rates if there should be unusual delay in installing piece rates?
13. Is it ever advisable to offer an employee who has given his notice more money to stay?
14. What can you suggest to us that will assist foremen in becoming more efficient on their jobs, especially with reference to handling personnel problems?

"Progress Clubs"—Montgomery Ward and Company

The foremen's meeting has been carried a step further by Montgomery Ward and Company of Chicago, who have organized "Progress Clubs" in which are enrolled various groups of executive officers. Each group meets at 4:45 P.M. once a week for discussion of a variety of company matters. Luncheon is served at the nominal cost of 25 cents. A schedule of topics is made out which determines the nature of the discussions for a period of two or three months. At the end of that time a new schedule is made out and a new set of subjects taken up. The material is presented in part by members of the firm and in part by outside speakers. Both men and women attend these meetings, the purpose of the club being to promote general interest in management problems.

Dennison Company Plan

The most effective work in training foremen or department heads is probably being done by concerns that have definitely organized training courses which emphasize instructional and management questions. The Dennison Manufacturing Company of Framingham, Massachusetts, above referred to, gave a series of lessons for foremen in 1917-18, which dealt with a wide range of organization and production topics. Among the subjects were "Locating the Industry," "Purchasing Materials," "The Meaning of Scientific Management," "Stores Methods," "Forms of Organization," "Machinery and Equipment," "Employment and Personnel Problems." The majority of the meetings were led by representatives from the company's regular staff. Part of the data in this connection is taken from an unpublished address by P. J. Reilly, formerly Employment Manager of the Dennison Manufacturing Company.

Advance Preparation

The plan was to devote each evening to some one definite topic. A paper of thirty minutes' duration was read and this was followed by a discussion. During the week before the paper was read, a selected reading assignment was prepared by the one who was to give the paper, printed in the shop, and distributed to the foremen. For example, in the discussion of "Personnel and Employment Problems," printed material was assigned taken largely from the May, 1916, Annals of the American Academy of Political and Social Science. As each foreman had read this before he came to the class he was much better prepared for consideration and discussion of the principles to be presented than would otherwise have been possible.

This session was in charge of the employment manager, who illustrated his talk from problems which had arisen in his daily contact with the foremen. After a general discussion, the group of fifty foremen broke into six groups of eight each and went into the committee room for round-table discussions of problems. These problems were put in the form of specific questions; the foremen considered the question from the point of view of what would be the wise, fair, human thing to do in each particular case.

Homework

In addition to the round-table discussions of the course, the foremen were given problems to take home and solve. The following is an example of the sort of problem proposed.

The transfer of an employee from one position to another sometimes brings up questions as to whether certain transfers should be made. Consider the following points:

1. Would you transfer a new employee from his first position, on his request, if the department had reported that his work and attitude were not satisfactory?

2. Would you transfer a satisfactory employee in certain work if she decides that she would like to try some other work to get a change? (This occurs more often in case of women.)

3. Would you transfer to other work, at his request, an employee who feels that he will never be contented in a certain department?

Fifty men, taking a very practical problem of that sort under advisement and writing a paper about it, are bound to indictate to the personnel management their precise reactions and attitudes toward the matter. As a result, the situations in the organization demanding careful treatment will almost invariably be revealed. In the case referred to the results of the homework and the response to these questions were very helpful to the personnel manager. Certain foremen, in the minority, were quite radical, and discussions showed their attitude. To show them a better way and to justify them in changing their point of view was a task much more easily brought about when the opinions of the majority of foremen were shown to agree on the solution of a particular problem.

The sessions of this class also helped to a material extent to get principles accepted that would otherwise have been difficult to have put into practice in a specific case. For example, when a foreman wants an employee discharged or transferred, he often cannot see the principle involved; he can see the principle in the abstract better than in the case of the individual with whom he is immediately concerned.

The following year the same group of foremen were brought into a class to discuss with a representative of the Massachusetts State Board of Education the best methods of training employees.

Training Supervisors—Montgomery Ward and Company

Montgomery Ward and Company, already mentioned, have organized a successful training plan for their supervisors. In this concern the supervisor has charge of a small group

of persons, the groups varying in size from six to twenty people. Formerly instruction of supervisors was given wholly by department superintendents, but it was found that this plan did not result in the development of co-operation nor the elimination of errors or sources of complaint. An analysis of the causes of leaving showed that the majority were due to very bad supervision. To correct this condition an intensive course of twelve lessons, each two hours in length, has been inaugurated.

The backbone of the instruction consists of a series of lectures and discussions which follow a mail order from the receipt of the letter to the placing of the goods in the car for shipment. Some attention is given to the aims and methods of the employment and instruction departments and the best technique to be followed in handling employees. In addition to a rating on performance in the class, each supervisor is given a mental examination and a grade determined by the number of errors and complaints arising from the work under his supervision. A final rating is then given which classifies the supervisor as good, fair, poor, or slated for elimination. Those who are rated fair or poor are given special assistance for a time. If they do not improve, they are transferred to some other department or eliminated.

A small group of college girls has been employed with the plan of having them spend a short time in each department over a period of about six months. At the same time they take the instruction given in the course for supervisors. There is also a group of college men who spend from three weeks to six months doing similar work. Each member of this group is subjected to individual study by the instruction department and final placement depends upon the opinion of the employment and instruction authorities. The majority of the supervisors in the concern are not high school graduates. It is the intention to give more thought in the future to the

selection of supervisors on the basis of their ability to deal with personnel questions, and this implies raising educational standards.

Rotating Foremen

The Dennison Manufacturing Company has a third feature in its work with foremen. This is a plan, which was put into effect in March, 1919, of rotating foremen through some of the staff departments, assigning foremen and department heads to the employment department, for example, for a period of three months. As an experimental beginning, the head of an important operating department was relieved of all other responsibility and appointed as temporary assistant to the employment manager. At the same time a research man was added to the staff and it was arranged that he should spend the major part of his time in the operating department. It was felt that by this means it was possible to do more to educate these executives in principles of wise personnel management than could be accomplished in any other way in two or three years. This plan is working out very satisfactorily.

The same plan could very well be applied in other departments. Men who have mechanical talent could spend some time with the master mechanic, gaining his specialized staff point of view. Others might well be assigned to work in the planning department or in making time studies.

One of the appreciable by-products of the rotation plan is the reaction which the men from operating departments are likely to have upon staff employees. They bring a different point of view and a fund of practical information which these persons cannot always command.

Groups Requiring Training

It is apparent from an examination of the courses outlined above and from a study of the work being done in several

plants that successful training of foremen in the future will be based upon a patient, thorough-going investigation of conditions within the concern. Two groups require training:

1. The inexperienced though possibly technically trained man, or the man from another line of industry, who must be taught the fundamentals involved in manufacturing processes. Courses somewhat similar to those designed by the Packard Motor Car Company or the Goodyear Tire and Rubber Company are essential. The student requires brief experience in several departments and a longer experience in some one department so that he can depend upon his own experience to furnish the information necessary to efficient management.

2. The foreman already in service, who must be taught to co-operate with his fellow foremen and with staff and line executives. For this group some emphasis needs to be laid upon production methods, upon company organization, department records and reports, and the planning of the day's work, but the crying need is for special instruction in methods of training employees and in furthering the purposes of the planning, employment, and training departments.

Preparing Materials for Training

For both groups the materials provided by time study and job analysis will yield information regarding the supervision of machines and processes, the rearrangement of tasks for teaching purposes, the quality of output, and safety inspection. As suggested in another chapter, the uses of job analysis in improving layout, in the choice and modifications of machinery, in scheduling, cost accounting, the selection of workmen, wage-setting, and the training of men and foremen have just begun to be appreciated by the industrial world.

Materials for the teaching of administration and organization will arise out of the formulation of standard practice.

Once the scope of authority and responsibility of officers, the exact nature of recording and accounting processes, the function of service departments, and the general policies of the business have been reduced to writing, there is in readiness a complete text-book by means of which definite, applied instruction can be given to executives of every grade.

The medical department and the safety and compensation officers should prove a mine of information on occupational diseases, personal hygiene, and accident prevention. It must be noted, however, that before the foremen can use the data a thorough reorganization and re-expression in teaching terms are always required.

In addition to these three main resources, the instructor in the duties of a foreman will naturally draw from outside sources supplementary material on the general underlying principles of administration as well as on such topics as the functions of capital and executive control in production, the psychology of the learning process, the adaptation of the task to the instincts of the worker, the philosophy of personal tact and efficiency, and the value of shop morale and business ethics. The following outline is suggested as including the topics which ought to be touched upon after the foreman has become familiar with the general processes of manufacture.

Outline of Training Course

1. *Plant, machinery, equipment, materials, and processes or operations:* Plant layout; power; purchasing; receiving and distributing materials; the shipping department; stockkeeping; routing; classification of processes or operations; standards of output; maintenance or upkeep of department.
2. *Company organization and policies:* Functions of executives and relations between departments; special administrative problems affecting foremen; history and policies of the company.

3. *Planning the day's work:* Scheduling and routing; elimination of waste in materials, idle machinery, and unnecessary labor; fatigue; time study; aims and methods of the planning department; interdepartmental co-operation; teamwork.
4. *Production records and reports:* Cost accounting; inventories; methods of distributing overhead; requisitions; job and pay tickets; reducing waste; technique of making and filing reports; use and methods of preparing special reports.
5. *Employment and service management:* Aims and methods of the employment department; interpretation of statistics of accidents, infections, lost time, labor turnover, absenteeism, etc.; proper attitude toward promotions, transfers, discharge, and discipline; wages and hours of labor; stimulating individuals and groups to better accomplishment; tact in handling employees; hygiene; plant sanitation; home and community problems affecting the shop; job specifications; rating employees.
6. *Training employees:* Job analysis for training purposes; steps in the learning process; co-operation with the plant educational director and with community institutions; what training has accomplished in other plants or other departments; developing esprit de corps.

Special Training Methods

A foreman's class, like a class for minor executives, ought to depend very largely for its content upon the specific problems arising out of the daily task. Lecturing to foremen in large groups cannot possibly accomplish the ends sought by the courses which are now being organized. The Dennison Manufacturing Company found that its second course for foremen, designed to teach something of instruction methods, failed because the class leader had no first-hand knowledge of the instruction problems arising in this particular company. Montgomery Ward and Company, on the other hand, found their course highly successful because the instruction was built

almost wholly about the difficulties encountered by the supervisors in their own departments.

The function of any outside educational institution thus appears to be confined to two principal channels:

1. The training of instruction directors who will appreciate what is involved in the training of a foreman and can then build up from within their own organization the materials necessary to effective training.
2. Staff advice to enable concerns to develop courses of their own and to organize their materials for teaching purposes.

These two functions, however, imply a third which consists in the formulation of the best principles of management and in collecting from plants throughout the country the best available examples of the control of materials, machinery, and men as related to the foreman's realm.

A thorough job analysis must usually precede any effective individual work with foremen. In most companies there are foremen in charge of key departments with only a few workers, who could not hold their positions without a great deal of technical knowledge or trade ability. Other foremen in equally important assignments ought to have superior ability in the management of help but need have very little of the trade skill or specialized knowledge required of operatives.

Job analyses and foremen's training prepare the way for a fairer and more complete appraisal of a foreman's value to the concern. The subject of rating foremen is treated in Chapter XV.

A course for foremen or a series of foremen's meetings may profitably give attention to preparing or revising a foreman's standard instruction book. It should contain a clear statement of company rules and general policies on all im-

portant matters coming directly under the foreman's charge or upon which he must make decisions. Such books are usually prepared in loose-leaf form, so that new regulations can be prepared on single sheets to be sent to each foreman for insertion in his copy. This plan interests foremen because it gives them a share in determining management policies.

Present Tendency and Prospect

With the extension of scientific management and the installation of staff executives, there has been a marked tendency to limit the scope of the foreman's duties, or to distribute them among several specialists. The foreman has only recently been asked to relinquish responsibility for the selection, training, promotion, discipline, and discharge of employees. Because he is in constant contact with employees, and because in the majority of cases it is impracticable to completely functionalize discipline, training, and other personnel matters, the foreman's position remains one of extreme importance. Neither employment management nor industrial training can succeed without his intelligent co-operation, and this cannot be secured unless he is educated into a sympathetic appreciation of the need for improvements. The technical and mechanical side of the foreman's training has already received attention in several educational institutions and private corporations, but no fully satisfactory technique has been evolved for giving instruction in the human engineering aspects of his task. Training in these duties of the foreman must be given on a part-time basis, preferably in the plant. The work is of sufficient importance to rank with training employment managers and directors and instructors for industrial education. It should receive state and federal support and ought to be made the subject of immediate research by colleges and technical institutions.

CHAPTER XIII

VOCATIONAL GUIDANCE IN SCHOOL AND IN INDUSTRY

Choosing a Vocation

There are relatively few modern elements in the problems of choosing a vocation or of making progress in a chosen field. People have always wrestled with these questions and have sought for information or counsel wherever it could be found. Some advice was always to be had, all of it only too willingly offered, part of it good, much of it based on false or hasty judgments. The new aspects of vocational guidance appear on the one hand in the increasing diversity of occupations, making it more and more difficult to choose a calling or to secure advantageous promotions or readjustments. On the other hand, they appear in organized efforts made by both school and industry to assist the individual in so analyzing his personal capital as to make the best use of it in socially productive ways.

Effective Vocational Guidance

Constant emphasis needs to be placed upon the statement that effective vocational guidance must be a personal, progressive matter, taking account of individual development and changing interests over a period of years. True guidance can come about only through a continuous adaptation of life in the school, in industry, and at home, designed to help the boy or girl discover his own abilities and limitations and adjust his vocational plans accordingly. The time has not yet come, and apparently never will, when one or two hours

with a counselor, who brings to bear his knowledge of human traits and occupational demands and uses some standardized system of tests, can be depended upon as the principal basis for the choice of a calling. All of these things are helpful, but they must be supplemented by directed activities on the part of the child as well as by systematic observation on the part of teachers, counselors, and parents, both continuing over a period of years.

Extending the Vocational Horizon

Without in any sense neglecting the aims of general culture, educational institutions could greatly improve the ways and means which they now offer for acquaintance with the practical world. There are almost endless possibilities in the present school program for the incidental introduction of activities which help the pupil to test himself or to broaden his vocational horizon. Among them are the teaching of community civics, emphasis upon the vocational aspects of science, history, geography, economics, drawing, and mathematics, English compositions on vocational topics, practical experience in shopwork, in domestic science, and in arts and crafts, the boy scout and camp fire girl movements, participation in debating, or athletics, and the management of publications and other school enterprises.

Principals have found that finding permanent or part-time employment for their students, with subsequent follow-up of the young worker, is not only a gain to the student, but is also very helpful to employers. Furthermore, undertaking work of this kind reacts in a favorable way upon the policies of the school which govern preparation for higher institutions.

Need of Vocational Literature

One of the chief needs at present is for more of the right kind of reading on vocational subjects to place in the hands

of students or young persons endeavoring to choose an occupation.[1] This applies not only to workers just entering a trade, but to older persons who desire to better themselves or to enter another line.

During the war, for example, the United States government needed thousands of trained workers for the shipyards. No literature was available to which the man engaged in a trade or the school or college graduate could turn for information as to where he might best fit into the shipbuilding industry. There was nothing in print that described the several operations of ship construction in a simple, accurate manner; that listed the typical trades represented; that pointed out the opportunities and avenues for advancement, the hours of work, and the rates of pay; or that would help a man in a given mechanical trade to decide whether his experience would be useful in a shipyard.

Here is a field in which the school and industry ought to co-operate to a much greater extent than has yet been attempted. Relatively few books of permanent value are available for school use and industry has contributed practically nothing for the guidance of its workers. A few job descriptions or specifications have been written and here and there an enterprising company has prepared descriptive literature regarding its work in the hope of attracting applicants or stimulating employees to prepare for promotion, but almost nothing has been done by way of presenting concrete, interesting material which critically analyzes the requirements of occupations in the light of mental, physical, and temperamental fitness.

"Life-Career" Classes

One of the most significant phases of the guidance move-

[1] For a list of such publications, see Brewer and Kelly, "A Critical Bibliography of Vocational Guidance," Harvard University Press, 1917.

ment has taken the form of "life-career" classes for students in the intermediate grades and in secondary schools. In these classes, pupils undertake a systematic study of vocations: the conditions of employment for young workers; kinds of work to avoid; opportunities for continuing one's general education after entering upon employment; the necessary training and qualifications for the broad general fields of employment; surveys of typical industrial, commercial, and professional occupations; and other matters affecting the choice of a vocation or successful entrance upon work. Where the life-career class cannot be provided, instruction of this nature is often introduced in connection with the usual school subjects.

Guidance Department Necessary

Experience in several cities has demonstrated that vocational guidance cannot successfully be carried on by a school system or an educational institution without trained leadership and specialized departments established for this purpose. The functions of a vocational guidance department may be summarized as follows:

1. To make surveys of local social and industrial conditions and educational opportunities.
2. To summarize vocational information and put it in form to be used by teachers, parents, counselors, and pupils.
3. To train and supervise teachers to act as counselors or instructors in life-career classes.
4. To organize classes and clubs to study occupations.
5. To supervise placement and follow-up for full-time and part-time employment.
6. To suggest changes in the work of the school to meet vocational demands.

7. To co-operate with employment managers and community agencies interested in vocational guidance.
8. To plan observation trips, organize library and museum material; supervise clubs and related student activities; arrange for speakers and auditorium programs on vocational subjects.

Guidance Problems in Industry

It seems to be fairly clear that by the provision of broad experience in the school curriculum, by a closer co-ordination of the school and the manifold aspects of social and industrial activity, much of the aimless drifting through school and through the early period of employment can be stopped. What then are the specific contributions which the industrial enterprise can make through its service and educational departments to promote effective guidance for its own employees? Assuming that the school has reached its natural limits in helping the child to choose his vocation and is doing its part in helping him to find suitable employment and become more efficient in his work, what ought to be accomplished by the factory organization? The main guidance issues center about three functions: the selection of applicants; transfers; and promotions.

It cannot be pointed out too often, as anyone who examines the haphazard methods still in use in the great majority of industries will realize, that success in maintaining a stable, efficient working force depends to a large extent upon bringing the right persons into the organization. In their anxiety to keep the ranks recruited up to normal, superintendents and foremen engage persons who are not well qualified for their work. It is often better to leave a position unfilled for a time than to employ some hastily selected person with the attendant risk of work badly done and the prospect of an early replacement. The key to the whole situation lies in the hands

of the interviewer; his qualifications and training are of first-rate importance.

Faulty Interviewing

The employee too often gets his first impressions of the company from a man who is crude, domineering, and unsympathetic, or from a young clerk who is brusque, perfunctory, and ignorant of working conditions. In most firms, indeed, a wholly disproportionate amount of attention is devoted to the problem of selling the product. Expensive display rooms, attractive front offices, and highly trained salesmen are considered essential to a good impression upon the public and prospective buyers. On the other hand, the men and women, whose interest and loyalty are fundamental to the existence of the enterprise, are met in some badly lighted, poorly ventilated basement room, or interviewed through a window in the gate by someone who has never had any preparation for his task and is personally unfitted for it.

Winning an Applicant's Confidence

The preliminary interview with the prospective employee is in fact a matter of the utmost importance. The physical environment should be appropriate, and above all the personality of the interviewer must be right. The interviewer has it in his power not only to win the respect and confidence of those who are accepted, but to enhance the reputation of the company with those who are temporarily or finally rejected. The latter advantage is often of much assistance in developing the sources of labor supply.

Experience has shown that there are certain minimum essentials to be observed in gaining an applicant's confidence and in discovering all that can be disclosed by an interview concerning his good qualities and shortcomings. There must

be a comfortable environment, privacy, the absence of any evidence of fatigue or worry on the part of the interviewer, and time for an extended conversation. It is of equal importance in most cases that the interviewer have some first-hand knowledge of the tasks for which he is engaging help as well as a general acquaintance with the social surroundings of persons of the class with which he deals.

Knowledge of the Occupations

The head of one of the largest state employment offices in the country said recently that his most difficult problem was to secure properly qualified interviewers. Because of unsatisfactory state civil service restrictions, it is possible for these places to be gained by young men and women wholly inexperienced in any practical line of work, and quite out of sympathy with the problems or point of view of those who seek the services of the office. The recognition of the necessity for the interviewer to be thoroughly familiar with the nature of each job and its requirements is already apparent among progressive corporations. It is not too much to hope that the public employment offices will come in time to adopt the same principle and will insist that interviewers be held responsible only for a limited number of trades and that they familiarize themselves with working conditions by first-hand investigations of the industries in their vicinity.

Organizing the Interviewer's Task

The section of the Emergency Fleet Corporation which deals with employment management in the shipyards has very wisely magnified the position of the interviewer. The great number and variety of the shipyard trades makes it necessary in all of the larger yards to divide the work among several persons, each of whom handles a certain group of trades.

Where many women are employed, either in the offices or at other work, a woman is engaged to interview female applicants. Figure 44 shows a modification of an office layout which has been found satisfactory in several of the large shipyards.

Applicants are met at the door by a preliminary interviewer who weeds out those who are quite unfit for any ship-

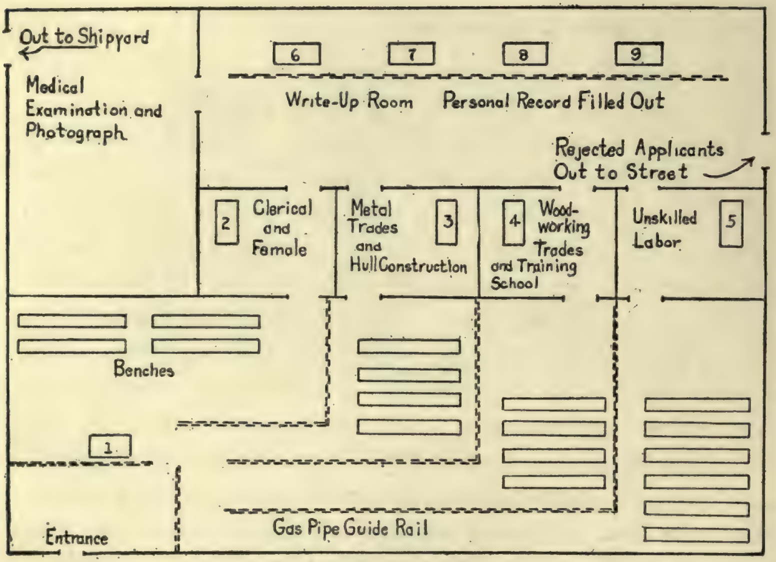

Figure 44. Layout for an Employment Office in a Large Shipyard
1, preliminary interviewer; 2, 3, 4, 5, interviewer's desks; 6, 7, 8, 9, recording clerks.

yard occupation as well as those who merely come to seek information. He then directs each of the others to some one of the interviewers, according to the work for which they apply. After a conversation with the interviewer in the cubicle, which assures a fair measure of privacy, the accepted applicant is passed into the next room to have his record formally filled out by clerks who are preferably middle-aged women.

The Interviewer as Adviser

There are many possibilities of service in the interviewer's work besides the function of accepting or rejecting those who apply for definite positions. He ought to give advice of value to young persons who are just entering upon their vocations, thus supplementing the activities of the vocational counselors and appointment secretaries employed by the schools and colleges.

Among the older persons who come to him there are many who are experienced in a number of different lines, or who have been unsuccessful in previous ventures; their best talents ought to be sought out and they should be helped to find satisfactory channels for development. By co-operating with an industrial physician who is thoroughly familiar with the physical requirements of each task, much can be accomplished in placing to good advantage persons who are physically handicapped. The war has made it necessary to care for our injured sailors and soldiers and an awakened interest is being manifested in the placement of industrial cripples in jobs where they can become economically independent.

Necessity of Several Viewpoints

Even when the interviewer has had experience in several departments within the establishment, it is unlikely that he has studied the trades at which he has been employed from the point of view of the mental and physical qualifications necessary successfully to engage in them. His information is fragmentary and badly organized; he must be taught to view work and those who do it from a different angle and to systematize his information for use in new ways. Very few skilled mechanics are good teachers and, by the same token, the skilled man lacks the additional knowledge and training necessary to become an interviewer.

After he has gained a general knowledge of the processes of manufacture and the methods of doing business, and knows the location and nature of the several departments into which the concern is divided, the interviewer will find it helpful to study the organization of the company, becoming familiar with the lines of authority and the relations among the departments and divisions. This will give him a clearer understanding of the problems of the firm and will make it easier for him to appreciate the relation of one job to another and the possible opportunities for advancement.

Job Study

One of the best ways for the interviewer, or any other member of the employment department, to gain an adequate comprehension of the "human" factors which center about each job, is to assist in drawing up a set of written specifications for hiring. This may occupy his time during a period of preliminary training, or he may engage in it during afternoons or slack periods.

Confusion sometimes arises in the use of such terms as "job analysis," "standard procedure," and "job specification," all of which denote somewhat similar forms of job study. In his article on "Time Studies for Rate-Setting on Machine Tools" in *Industrial Management* for June, 1918, Dwight V. Merrick divides a time study into six subdivisions:

1. Study of the work and conditions that influence its performance.
2. Analysis of the work into its elements.
3. Observing and recording the elapsed time for the performance of each of the elements.
4. Study and analysis of the records obtained in (3).
5. Determining a just time for the performance of each of the elements.

6. Preparing from the time-study records an instruction card, including the determination of an allowance for fatigue and unavoidable delays.

The first two of these subdivisions may be grouped together and termed a "job analysis," or a "preliminary job analysis" since it precedes the time study proper. Except where changes in machinery or processes are being considered with a view to the placement of women or physically handicapped persons, the employment department is not ordinarily concerned with an analysis which takes account of such fine divisions of the operation as the time study requires.

Standard Practice

Under scientific management, standard instruction sheets or written standard procedures are used to designate the way in which a machine operation is to be performed, or a given process carried out. The data for standard practice are drawn from time studies or experiments and from consultation with workers, foremen, and others who are concerned with the operation or process. The record describes each of the main and subsidiary steps in their proper sequence so that every operative or person in charge of a process may follow the approved method. As in the case of job analysis, these data are too detailed and technical to be of any great value to the employment department.

Job Specifications

A job or trade specification is not always concerned with a particular process or operation; it describes a position which one person is expected to fill and may thus include several distinct tasks or only one. It should be worded in such a way as to help an applicant in determining his own fitness for the place as well as to assist the interviewer in making

a selection. A satisfactory specification for hiring should have the following divisions:

1. A general description of the way in which the work is done and of the worker's environment.
2. A statement of the fundamental mental and physical qualifications and the education and experience expected in an employee.
3. A record of the conditions of service, such as wages, hours, shifts, vacations, possible lines of promotion, and other social and economic advantages or disadvantages.

In a previous volume, "Hiring the Worker" (pages 45 to 56), the author has summarized the advantages of job specifications. For the interviewer, the greatest gains come from making a systematic study of each position so that he may attain increased definiteness both in questioning applicants and in presenting the merits of the job to them. A further advantage is gained by having a standard upon which the employment bureau and the foremen or department heads are agreed. Uniformity of methods and standards among interviewers is extremely valuable in a large concern, and a basis of agreement between the employment manager and foremen is helpful in the smaller enterprise.

Some Typical Job Specifications

Figure 45 illustrates the form of job specification used by the Trade Test Division of the Committee on Classification of Personnel in the Army. Several hundred trades have been described in this way and are now available in a volume issued by the United States Army. During the wars, these specifications were used in classifying and allocating tradesmen in the Army.

66-PIGEON FANCIER

Pigeon Expert, Homing Racing 66-h PAEJD

DUTIES

1. Organization, supervision of flying and breeding of large groups of homing pigeons.

QUALIFICATIONS

2. Must have had extended successful personal experience in the breeding, training and racing in competition of racing homing pigeons and ability to supervise organization of large and modern central lofts.

Must have extended knowledge of, and had successful application of principles of cross, or inbreeding, and have thorough familiarity with standard American and foreign
441 breeds and bloods, and prominent records and birds.

Must have a full knowledge of foods and food values, and variations thereof for changing seasons and conditions, and an extended knowledge of approved methods of training of birds in his own loft, and successful competition in races, with extended knowledge of approved methods of keeping breeding and pedigree records.

Must have a full knowledge of types of standard lofts, and requirements therefor and mechanical ability to keep lofts in proper condition.

Experience in the handling, and instruction of men and some military experience is desirable.

SUBSTITUTE OCCUPATIONS

3. Pigeon fancier.

Figure 45. Form of Job Specification

Used by the Trade Test Division of the Committee on the Classification of Personnel in the United States Army.

A somewhat similar form, illustrated in Figure 46, is used by the Emergency Fleet Corporation in its bulletin "Aids to Employment Managers and Interviewers on Shipyard Occupations" and by the United States Bureau of Labor Statistics in specifications for a great variety of trades which it is preparing for the use of the Federal Employment Service.

BOLTER-UP

Other Names by which Occupation Is Known:

Bolter

Occupations Most Nearly Allied:

Machinist's Helper, Boilermaker's Helper, Regulator.

Trade Requirements:

The Bolter-up fastens the plates, beams, etc., in place on the vessel, so that they may be reamed and riveted. Two Bolters-up usually work together—one with a maul and drift-pin, the other applying the fastening bolts.

Education:

Common school, or none.

Physical Requirements:

Average strength and endurance; agility.

Mental Requirements:

Average intelligence.

Experience:

The Bolter-up is usually recruited from the more agile and alert helpers or laborers in the shipyard. It requires several weeks to become an efficient Bolter-up.

Entrance Requirements for Training School:

Average intelligence; ordinary physique; not under 18 years of age.

Rate Established:

Figure 46. Job Specification Designed by the Emergency Fleet Corporation

A certain amount of additional data of local significance, especially informative to a beginner in that line of industry, should appear on the job specifications prepared by a private firm. Figure 47 is a form which includes the best features of several blanks now in use.

GENERAL REQUIREMENTS

Occupations.................................Index No.............
Department.................................Foreman...............
No. Male Operatives...........Female........Total..................
No. Under 18 yrs .of age: Boys...............Girls......Total........
Permanent position..........Temporary.........Seasonal.....Steady...
Hours: First shift: A.M.........P.M......... Lunch Hour..........
Second shift: A.M.........P.M......... Lunch hour...........
Third shift: A.M.........P.M.......... Lunch hour...........
Saturday P.M.......... Lunch hour...........
Vacation arrangements...............
Time required to learn job................. Piece-work or time........
Wages to start............Advance..........When.....Maximum....
Duties..
Experience necessary for first-class rating:..............................
Kindred trades...
Special qualifications...
Read................ Write.............. Use blue-prints...........
Do employees sit or stand? .... Percentage of time............
Work heavy........Dusty.........Wet........Hot..................
Heaviest weight lifted on this job.......... Other disadvantages........
Nationality preferred...
Opportunity for promotion from.................to.................

PHYSICAL REQUIREMENTS

Age.....to......Height.......Weight.......Eyesight .... Degree of Strength....
Can women replace men?.............How many women?........
Special qualifications for women.......................................
What changes should be made if women are used (ventilating systems, toilets, chairs, conveyors, etc.)......................................
If persons with physical disabilities can be used, state probable number in each case. Under *Remarks*, state changes necessary in machinery or procedure and extent of disability allowable, referring to disability by number. 1. Leg. 2. Arm. 3. Hand. 4. Weak lungs. 5. Heart disease. 6. Defective sight. 7. Defective hearing. 8. Other handicaps.[1]
Remarks:

[1] Other handicaps: t.—trunk injuries; g.—general weakness; rh.—rheumatism; h.—hernia.

Figure 47. A Job Specification Adapted for General Factory Use

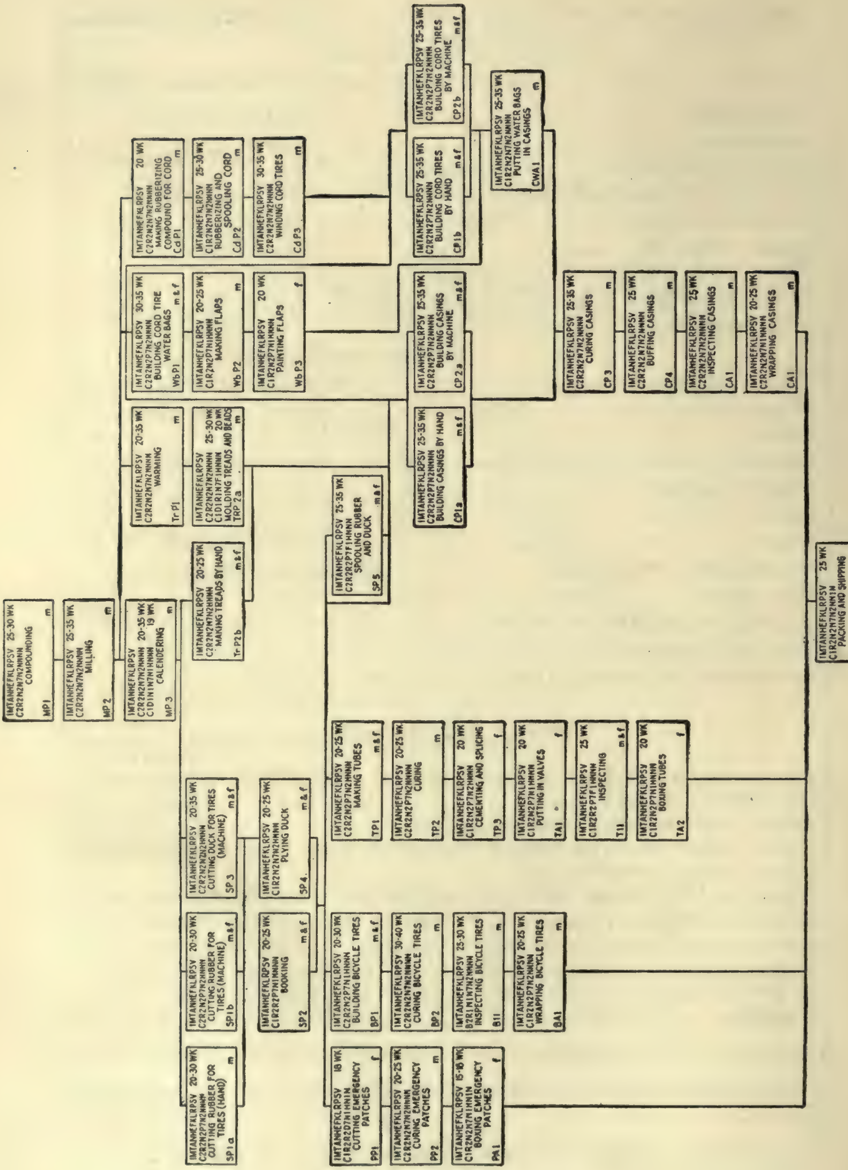

Figure 48. Specifications for Physically Handicapped Men Used by The Harvard Bureau of Vocational Guidance

A form of specification which readily lends itself to several important uses is exemplified in Figure 48. A. B. Segur of the Red Cross Institute for the Blind in Baltimore used a modification of this plan in surveying the Chicago stock-yards. It has been developed somewhat further and is now being used by the Harvard University Bureau of Vocational Guidance in its surveys of occupational opportunities for physically handicapped men. The chart shows the sequence of operations in a concern manufacturing rubber tires.

Each block on the chart is the exact size of the one printed below. The name of the operation or job appears in the center and the significance of each of the other sets of figures and letters are shown in the key.

I M T A N H E F K L R P S V	$20 wk
C 1 R 2 N 2 P 7 N 1 H N N N	
Putting in Valves	
TA1	f

Sample Block from the Specification Chart

Qualifications and Disabilities	Weekly Wage
	Classification
Job No.	Male or Female

Key to the Sample Block Shown Above

The upper row of letters in the upper left-hand corner of the block refer to the qualifications and disabilities appearing after the same set of letters in the reference list of symbols which follows. The code is interpreted thus: The letter *C* under *I* on the block means that the third grade of intelligence

is required in polishing, while the figure 1 under *M* indicates that it takes an employee about 1 month to learn the operation.

Reference List of Symbols for Job Specifications

I: Intelligence. *A,* highest grade executive capacity; *B,* capable of acquiring and using technical knowledge and directing others; *C,* ordinary intelligence, capable of following instructions; *D,* all others of lower grade.
M: Months to learn the work required under average conditions.
T: Training and education. *X,* illiterate; *B,* can read blueprints; *R,* can read and write; *U,* university or college technical training; *S,* secondary school technical training; *C,* clerical training.
A: Arms. 1 or 2.
N: Nerves. *N,* normal; *R,* reliable; *S,* shell-shock.
H: Hands. 1 or 2.
E: Ears. *N,* normal; *P,* poor; *D,* deaf.
F: Fingers. 0 to 10.
K: Kidneys and other trunk organs. *N,* normal; *F,* fair; *W,* weak; *U,* unfit.
L: Legs. 1 or 2.
R: Rupture or hernia. *N,* normal; *H,* hernia.
P: Pulmonary or lungs. *N,* normal; *P,* poor; *A,* arrested tuberculosis.
S: Skin. *N,* normal; *I,* irritated; *D,* diseased.
V: Vision. *N,* normal; *P,* poor; *B,* blind.

The plan is quite flexible and can be adapted to fit any set of qualifications. By cross-references to organization and promotion charts, it is possible to get a complete story of the organization for the use of the employment department in comparatively little space.

Acquaintance With Supervisors

Besides a familiarity with the job, the interviewer needs a close acquaintance with those for whom he hires help. Even

the interviewer who has come from some department within the concern must keep constantly in touch with those who supervise employees, studying the employment needs and the demands of their departments as well as their personal peculiarities. He should attend foremen's meetings, meet executives at luncheon, visit both office and factory departments, and make frequent occasions for discussions of mutual interest with department heads as well as foremen and minor executives.

Knowing Sources of Labor Supply

An analysis of the sources of labor supply will reveal the lines of study outside of the plant which the interviewer ought to be encouraged to pursue. Does he deal with persons who come recommended by schools and colleges? Then he should learn something of their characteristics and how their courses of study differ; he should meet teachers, principals, or vocational counselors and form some judgment as to the relative value of their recommendations. Does he accept applicants from employment bureaus, from labor organizations, the Y. M. C. A., or charitable associations? Then his work suffers unless he has formed an acquaintance with their interviewers or secretaries and makes some clear distinctions as to the relative worth of the statements they make regarding the persons they send.

Familiarity With Other Plants

A familiarity with other plants and their methods will be an asset of immense value. If Smith is leaving the Jones Manufacturing Company, his story can be interpreted to much better advantage if the interviewer knows something of the Jones Company's methods of doing business or is acquainted with Smith's foreman. Even in a large city, the interviewer or employment manager who definitely pursues inquiries along

these lines will in the course of a few years find himself in possession of a surprising fund of pertinent information.

Use of Observational Tests

Those who have advocated observational methods for analyzing character or vocational aptitudes base their contentions upon theories which are pretty thoroughly discredited. The idea that the color of the hair or the shape of the face is directly associated with well-defined mental traits, is a mistaken one. Modern psychology makes such a view impossible. Moreover, the grouping of individuals into types, which is implied in determining character by observations such as those mentioned above, violates the well-established law of biological variation. In the mental as in the physical realm, no two individuals are alike, though each is an intricate and complex bundle of mental factors. And it is this infinite complexity of the factors which enter into the individual make-up, all distributed in any large, unselected group of individuals according to the normal curve of probability or the "law of chance," that renders classification according to types erroneous and futile.

Of the several variables or factors which the exponents of the observational method use, the most important are the ones least emphasized. Facial expression, posture, personal habits, physical condition including nutrition, the voice, manner, and style in writing and speaking, are always of much greater consequence than the texture of the skin, the color of the eyes or hair, or the configuration of the face. Given a normal mentality and physique, vocational fitness can be determined much more accurately by a study of home and social environment, education, and previous experience, than by any observational method yet proposed. Much more reliable methods of assessing human talents and shortcomings are to be found in the psychology of behavior than in

phrenology and physiognomy. The literature on the subject opens up a multitude of avenues for serious thought and observation.[2]

It should be pointed out in this connection that the assistance to be gained from a thorough physical examination made by a competent physician has been too well demonstrated to require any extended argument in its favor. It is also probable that the past record is of more consequence than is commonly supposed. Contrary to the usual opinion, those who rank in the upper fourth of their high school classes tend to retain that position in college and later in vocational life. Similarly, those who do poor schoolwork, ranking in the lower fourth of the preparatory school classes, tend to do poor college-work and are not likely to be successful either in the professions or in business.

The Use of Psychological Tests

For the most part the tests for adult intelligence, so far devised, do no more than indicate some of the grosser differences in intelligence. Tests like those of Binet and Simon or the revisions devised by Terman and Yerkes are merely intended to determine the relative amount of the child's mental development and are unsatisfactory beyond the chronological age of fifteen years. No satisfactory single test or groups of tests for differentiating grades of adult intelligence, except of the grosser sort, have been seriously proposed.

The majority of the so-called vocational tests are nothing more than standardized methods of indicating the more important differences in general intelligence. Thus the tests for salesmanship or clerical positions are, in the main, of value in that they help an employer who has no previous knowledge

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[2] Such books as the following can be read with the greatest interest and profit—Freud-Brill's "Psychopathology in Every Day Life," Holt's "The Freudian Wish and Its Place in Ethics," McDougall's "Social Psychology," and Parmelee's "Science of Human Behavior." As a rule, subnormality of neither mind nor body can be diagnosed successfully except on the basis of searching inquiry into many factors.

about the applicant to arrive at some conclusion as to his probable place in the mental scale. To be sure, a few of these systems contain tests which call for activities resembling those performed by the employee, such as standardized tests in spelling, dictation, and typing for stenographers. In such cases there is no question as to the practical value of the test material if it is properly used.

Unsatisfactory Tests

Particularly unsatisfactory is the type of test which assumes to ascertain vocational fitness by analogy, such a test as Münsterberg's method of choosing ship captains by examining the subject's ability to make quick decisions in sorting cards. By trying for speed and paying no attention to accuracy a person may make an excellent record. The test seems to suggest that a ship captain should make quick decisions whether he goes on the shoals or not.

There has been an unfortunate tendency in certain quarters to recommend tests which have been tried on only a few individuals and for which no satisfactory standards are available. A recent volume on this subject contains a number of schemes wholly unworthy of serious consideration. It contains several experiments which have been tried out on only ten, twenty, or thirty individuals. It is, of course, impossible to employ material of this kind unless it has been tried under controlled conditions upon a large number of cases. Tests tried on a small number of employees who represent selected groups are of very little practical use.

Army Trade Tests

The Committee on Classification of Personnel in the Army have developed a number of trade tests which have been successfully utilized in placing soldiers and sailors and which

seem to open a hopeful field of experimentation. These tests are of three kinds: standardized questions, picture tests, and performance examinations. The following examples will indicate the general nature of the method:

United States Army Standard Preliminary Examination for the Carpenter Trade

1. Question: What portion of the length of a 16" shingle should be exposed to the weather on a roof?

Answer: Not over 5 inches.

2. Question: What figures on the steel square would you use in marking a miter?

Answer: Any two equal figures.

3. Question: What is the usual size of a 2" x 4" after it has been sized on one side and one edge?

Answer: 1¾" x 3¾".

United States Army Standard Performance Test for the Carpenter Trade

1. Test: Take this 3-ft. piece of 1 x 6 and saw it into two pieces of 1 x 3.

Memorandum: The line of cut should be marked full length of board. Cut should be made with rip saw following the line accurately. The angle of the saw should remain the same during the full stroke of the cut with a full arm movement.

Reply: Face of cut should be perfectly straight and smooth and at right angles to the face of the board.

2. Test: Take this 2-ft. piece of 1-inch half-round moulding and cut one end at an angle of 45 degrees—the other end at 30 degrees—using a miter box.

Memorandum: Moulding should be placed in miter box and the proper angle for the cut selected. Saw used should be fine tooth and the stroke should be almost horizontal throughout.

Reply: Cut should be sharp and clean. Saw should not cut into miter box.

The material for these tests was secured by thorough investigations of each trade in order to discover suitable questions and simple problems. The tests finally selected were standardized by trying them upon groups of experts, journeymen, apprentices, and novices. Questions which could not be answered or work which could not be performed by novices served to select the tradesmen, while problems which could only be solved by the expert were intended to eliminate applicants having a relatively small amount of experience. Those in charge of the army tests claim for them three advantages:

1. Uniformity in method.
2. Problems and answers so well standardized that they can be used by persons without special training in experimental psychology.
3. Only a few minutes are required to give them.

Experimentation in this field can not be successfully attempted in industrial plants or business houses by persons who have not had the statistical and psychological training necessary to comprehend fully the steps involved in formulating and standardizing the test material. On that account there is little value in offering instruction on these subjects to interviewers who have not had college preparation or its equivalent.

Choice of Interviewer

In a small concern it will be necessary for the employment manager to interview the majority of the applicants and even in larger establishments he may be called upon to select employees for certain positions or departments. There appears to be a tendency in the direction of selecting for employment managers men who have had extensive shop experience but very little education. The success of concerns that have tried the opposite method of choosing persons who have had a few

years' contact with industry and a considerable amount of technical or professional education proves that the latter type of qualification gives much better results. An examination of the work done by an interviewer in any large, well-organized service department reveals the need for a similar kind of preparation.

Value of Practical Experience

The point just made needs emphasis. Too much stress cannot be laid upon the value of having some practical experience in shop or factory work. This ought, if possible, to have been done under the urge of economic necessity; otherwise the point of view of the worker is never completely grasped. The interviewer who has spent a good many years at his trade comes by a kind of intuition to recognize those who are well qualified in his line. Like the prosperous business man without special training who makes no use of modern methods of accounting and investigation, he succeeds in spite of his limitations and may in the long run make very few serious blunders.

It is a mistake, however, to suppose that a knowledge of the job alone will enable the tradesmen to select others for it. There are so many diverse factors which enter into his work and which help him to become proficient that general educational qualifications ought not to be neglected. He can acquire a sufficiently thorough knowledge of the positions to be filled in a relatively short time if he has the intelligence and training which fit him to collect and organize new information.

CHAPTER XIV

ORGANIZING FOR TRANSFERS AND PROMOTIONS

Transfer of Employees

Any adequate solution of the problems of vocational guidance involves systematic provision for the transfer and promotion of workers who have already entered on a vocation. Too often at present this is neglected. The employee who fails to give satisfaction in the task for which he is hired is summarily dismissed; there is little inclination to make readjustments within the department, and no machinery for discovering and utilizing special talents or abilities by shifts to work under other foremen. The losses arising from this source are many.

Under centralized and co-ordinated control of employment these losses are greatly reduced. The employee receives intelligent, sympathetic consideration instead of being shunted at random from job to job. Seasonal or emergency fluctuations are cared for by carefully planned transfers within the plant; the concern gets the advantage of workers familiar with the company's methods and policies while employees are saved the time that would otherwise be wasted in a lay-off or in seeking other employment. Control by the employment department of discipline and discharge greatly lessens the labor turnover resulting from petty grievances, malicious or ill-advised action on the part of foremen, and errors in the original assignment to work. A careful review by some representative of the employment department of every case of discharge or voluntary leaving, acts as a check on thoughtless or ill-tem-

Employment Report for week ending 7 A. M. Monday,__________19

REASONS FOR LEAVING

			I	II Work		III Working Conditions		IV	V Health					VI	VII	VIII Discharged			IX	X Laid Off		XI Personal Reasons					XII							
REPORT DEPARTMENTS:	No. on payroll at beginning of business Monday	Engaged this week	Wages	1 Job	2 Hours	1 Physical	2 Social	Prospective advancement	1 Accident or ill-health previous to employment here	2 Occupational accident or ill-health since employment here	3 Non-occupational accident or ill-health since employment here	4 Unknown ill-health	5 Not physically adapted for the job	Mistaken placement in other respect	Military	1 Inefficiency	2 Unreliability	3 Misconduct	Suspended	1 Departmental fluctuation	2 Temporarily employed, or leave of absence	1 Unstable	2 Job undesirable for purely personal reason	3 Preferable position, perhaps without regard to wages	4 Distance	5 Other personal reasons: marriage, removal, relatives, home cares, rest, education, etc.	Unknown	Transferred out	Through this week not interviewed immediately	Interviewed this week, not immediately upon getting through	Total	No. on payroll at beginning of business Monday		
Raw Materials																																		
Reclaiming																																		
State Gen'l., Wash & Dry																																		
Mixing																																		
Calender Days																																		
Calender Nights																																		
Cloth																																		
Heel																																		
Cement House																																		
Cutting																																		
Fitting																																		

Figure 49. Section of a Report Form for Interviewing Employees Who Are Voluntarily Leaving. (Size $9\frac{1}{2} \times 14$.)
Used by a rubber factory employing about 8,000 persons.

SOME REASONS FOR LEAVING ______________ 19

	I Wages								II Work (inherently)												III Working Conditions													
			3. Wage Conditions						1. Job							2. Hours					1. Physical							2. Social						
DEPARTMENTS:	1 Pay too small	2 Better paying position secured or expected	(a) Overtime	(b) Sunday time	(c) Payment for waits	(d) Payment in team	(e) Insufficient work	(f) Other	(a) Excessive requirements	(b) Heavy	(c) Fatiguing	(d) Monotonous	(e) Waits	(f) Unknown	(g)	(a) Long hours	(b) Night work	(c) Undesirable shift	(d)	(e) Other	(a) Dangerous	(b) Hot	(c) Dusty or dirty	(d) Wet	(e) Machine or other equipment	(f)	(g) Other	(a) Difference with superior	(b) Difference with others	(c) Supposed bad treatment by Superior	(d) Objectionable social conditions health, morals, nationality, etc.	(e)	(f)	(g) Other
Reclaiming																																		
State Genl., Wash. & Dry.																																		
Mixing																																		
Calender Days																																		
Calender Nights																																		
Cloth																																		
Heel																																		
Cement House																																		
Cutting																																		
Fitting																																		
Preparatory Making																																		
Gum Shoe																																		
Apprentices																																		

Figure 50. Classification of Employees' Reasons for Desiring to Terminate Employment. (Size 9×11½.)

Used to supplement form shown in Figure 49.

pered action and frequently opens the way for saving valuable employees to the company.

The reports shown in Figures 49 and 50 have been used by the Hood Rubber Company of Watertown for compiling a record of these cases. A well-trained, experienced man gives his entire time to the investigation of matters brought to light by his interviews with employees desiring to leave the firm or with persons who have proved unsatisfactory to foremen or department heads. Such a practice successfully prosecuted implies not only good vocational guidance, but also a progressive modification of manufacturing methods, working conditions, and general policies.

Causes of Transfer

The common causes for transfer which can be distinguished from those involving promotion may be summarized thus:

1. Personal feeling arises between the employee and his superiors or other employees.

2. The person is not qualified for the kind or grade of work assigned.

3. Health conditions may demand a change.

4. Requests for transfers come from employees who have fitted themselves for some other line of work.

5. Certain tasks become irksome and dissatisfaction is avoided by occasional changes.

6. Seasonal or emergency fluctuations in production necessitate shifting workers from one department or task to another.

7. Additions or changes are made in equipment or buildings, thus increasing or decreasing the number of persons employed.

8. New employees are taken on for temporary work to which they are not especially well adapted with the understanding that some change will occur later.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

S.B.C. 867

SUBMARINE BOAT CORPORATION. NEWARK BAY SHIPYARD. PORT NEWARK, N. J.

Name Last First Second

Address PHONE

Clock No.	Department	Occupation	Date	Rate

Age

Weight..................

Height..................

Color Eyes
Brown
Black
Blue
Gray

Color Hair
Brown
Blonde
Black
Auburn
Gray

Physical Disability

Birthplace

Date of Birth

Nationality

Race
White
Colored
....

Years in U. S. A.

Citizen—Yes No

Father—Yes No

Single

Married

No. Dependents

Under 16 Years

What Relation?

In Case of Accident Notify

Relation

Address
Same

City

State

Phone

Have You Worked for This Company Before?

Yes ______________ No ______________

Name Relatives Working Here If Any

Give the last two concerns for whom you worked, state just what kinds of work you performed, the length of time spent on each class of work, rate of pay, and reason for leaving each concern.

Name of Firm and Address	Details of Work	From Date to Date	Rate	Reason for Leaving

Check the following trades at which you have worked with a (✓) and write the number of years' experience in column marked "LENGTH OF EXPERIENCE." If you have worked as a helper write (H) after the trade. If pusher write (P) after the trade. Double check the trade you are most skilled in.

Trade	Length of Experience	Trade	Length of Experience	Trade	Length of Experience	Trade	Length of Experience	Trade	Length of Experience	Trade	Length of Experience
1 Electric or Acetyl. Welder		14 Coppersmith		27 Steam Fitter		40 Roller		53 Fireman		66	
2 Bolter Up		15 Deck Fitter		28 Tinsmith		41 Shearer		54 Fireman (Protection)		67 Superintendent of Construction	
3 Caulker-Chipper		16 Electrician		29 Machine Erector		42 Shipsmith		55 Garage Mechanic		68	
4 Driller-Reamer		17 Joiner		30 Marker		43 Template Maker		56 Gasoline Engineer		69 Bricklayer	
5		18 Layer Out		31 Floor Hand		44 Toolmaker		57 Guard		70 Carpenter	
6 Riveter		19 Painter		32 Bench Hand		45 Fitter Up		58 Locomotive Crane Engineer		71 Cement Worker	
7 Packer		20 Pipe Fitter		33 Blacksmith		46 Millwright		59 Locomotive Engineer		72 Lather	
8 Passer-Boy		21 Pipe Coverer		34 Furnace Heater		47 Loftsman		60 Stationary Engineer		73 Metal Lather	
9 Rivet-Heater		22 Plumber		35 Lathe Hand		48 Brakeman		61 Switchman		74 Plasterer	
10 Ship Fitter		23 Sh. Met. Worker		36 Machine Hand		49 Chauffeur		62		75 Structural Iron Worker	
11 Bucker Up		24 Ship Rigger		37 Machinist		50 Conductor		63		76 Pile Driver	
12 Boiler Maker		25 Sign Painter		38 Machine Riveter		51 Elec. Craneman		64 Boatman		77	
13		26 Staging Builder		39 Puncher		52 Elec. Derrick Operator		65 Inspector		78 Laborer	
										79	
										80	

I certify the above written information is correct.

Sign Here ______ Address ______

Date ______ Signature of Interviewer ______

Figure 51. Form for Recording Qualifications of Employees (upper and lower halves)

Used by Submarine Boat Corporation. Designed to facilitate transfers. Original on heavy manila paper, folded in the center to hold other records.

Recording Devices

Various devices are in use for recording the qualifications of employees in such a way as to render the routine of making transfers easier for the employment office. At the Submarine Boat Corporation of Newark, New Jersey, transfers are effected by means of the folder shown in Figure 51. To aid quick reference, tags of various colors are used. The number of the trades represented in the plant are printed across the top of the folder in two lines: 1 to 40, and 41 to 80. The trade for which the worker is hired is indicated by a red tag for trades numbered from 1 to 40, and a blue tag for trades numbered from 41 to 80. To indicate a trade in which the worker has had experience a green tag is used for trades numbered from 1 to 40 and a yellow tag for trades numbered from 41 to 80.

When additional workers are wanted in any part of the plant, a demand is made upon the employment department, which first consults the employment records in the folders. Before taking on new men, transfers are made of those who can be spared from the departments in which they are working, or who can be properly assigned to the work for which the call comes.

All this saves time in securing new men and expedites work in the yard. It also creates a good feeling toward the company on the part of the worker because it means placing a man finally where he is best fitted to be.

It is essential that those having charge of transfers safeguard themselves against the corrupting tendency to substitute a shift to another position for a determined effort to remove disturbing causes. In many cases it is wise to refuse the request for transfer, and seek to remedy bad working conditions, to adjust differences of opinion or eliminate prejudices, to improve the worker through training, or to enforce salutary discipline.

Promotions

In summarizing the effect of scientific management upon advancement and promotion, Professor Robert F. Hoxie, in his "Scientific Management and Labor," concludes that advanced positions are more often recruited from within the shop than is the case under the older forms of executive control. This assurance may very well offset some of the disadvantages of scientific management claimed by organized labor, since a knowledge that the better paid and more responsible positions are to be filled from the ranks is one of the strongest incentives that can be held before the workman. Mr. Taylor and his associates also claim for scientific management increased stimulation through systems of wage payment which provide rewards for increase in quantity or improvement in quality of output. Functional foremanship and other staff departments create new divisions of responsibility not previously within the reach of shopworkers. There is usually provision under scientific management for the rating of each employee on several points, and there is at least available a record of individual earnings and output.

Criticisms of Scientific Management

Over against these advantages Professor Hoxie in "Scientific Management and Labor" places the following criticisms.

> In the first place, as we have seen, scientific management often fails in the development of functional foremanship, and in the elimination of favoritism. Secondly, it tends to create a multitude of new tasks on which less skill is required and lower rates can be paid; has developed no efficient system for the placing or adaptation of the workers; is inclined, in practice, to regard a worker as adapted to his work and rightly placed when he succeeds in making the task; tends to confine the mass of the workmen to one or two tasks, and has afforded little opportunity, therefore, for the discovery and development of special aptitudes among the

mass. Moreover, careful record-keeping and the knowledge which it conveys to the management have their disadvantages as well as advantages, looked at from the viewpoint of advancement. The employer is loath to take a worker from a task where he is making a high efficiency record, and the man or woman whose record is not good is more surely destined to a less skilled and perhaps narrower task.[1] The fact is that scientific management, in practice, has the tendency to divide the workers into two unequal classes—the few who rise to managerial positions, and the many who seem bound to remain task workers within a narrow field. In this, it does not differ essentially from the ordinary modern industrial organization based on machine production, except that perhaps the differentiation is more quickly and surely attained.

Distribution of Ability

In considering the issues suggested by the foregoing statement, one of the fundamental questions to be answered concerns the number of persons who are fitted to undertake work involving a high degree of skill, executive responsibility, or the exercise of judgment based upon observation and investigation. The records available from psychological, medical, and educational sources seem to indicate that not less than one-quarter of our working population is unfitted by reason of native endowment for anything more than unskilled or semiskilled occupations. On the basis of "normal frequency" a determination of the distribution of ability has been made which experience shows may be depended upon within reasonable limits.

If the entire population is divided into five groups according to mental capacity, the distribution is estimated to be as follows:

From 2 to 5 per cent of the population fall into the low-grade group which includes the mental defectives. Approximately an equal number have abilities or attainments of

such a high order as to place them in the group with those who may be termed geniuses. Nearly 50 per cent belong in the large middle group of dependable, intelligent persons. Above this group, are ranked 23 per cent of somewhat higher intelligence, while another 23 per cent with abilities less than those of the middle group can only be depended upon for the performance of routine tasks. Such studies as the research in the psychology of employed minors, carried on under the supervision of Helen Thompson Woolley in the Vocation Bureau of Cincinnati, Ohio, the results attained in testing both children and adults with various forms of the Binet-Simon scale for measuring intelligence, and the applications of standardized test material to the work of elementary schools, and to the examination of recruits for the United States Army, all seem to bear out these general conclusions.[1]

Physical Fitness

On the physical basis alone, rejections in the first army draft aggregated 66.5 per cent of those examined by local boards after the first call, and in some districts rejections ran all the way from 40 to 77 per cent.

At least 35 per cent of the total rejected by the local boards were in poor physical condition, and of those passed and re-examined by army officers, 11.5 per cent were rejected as physically unfit. This occurred in spite of the fact that the men examined were between the ages of 21 and 31 when they should have been in the height of physical vigor.

Of 82,936 enlisted men who took the army mental tests, nearly one-third received a grade of C or less. (See Figure 52.) That the majority of these men were unfit for leadership is demonstrated by the records of the officers' training

[1] Woolley, Helen Thompson, "A New Scale of Mental and Physical Measurements for Adolescents, and Some of its Uses." *The Journal of Educational Psychology*, November, 1915. See also Terman, "The Measurement of Intelligence," and Holmes, Henry Wyman and others, "A Descriptive Bibliography of Measurement in Elementary Subjects."

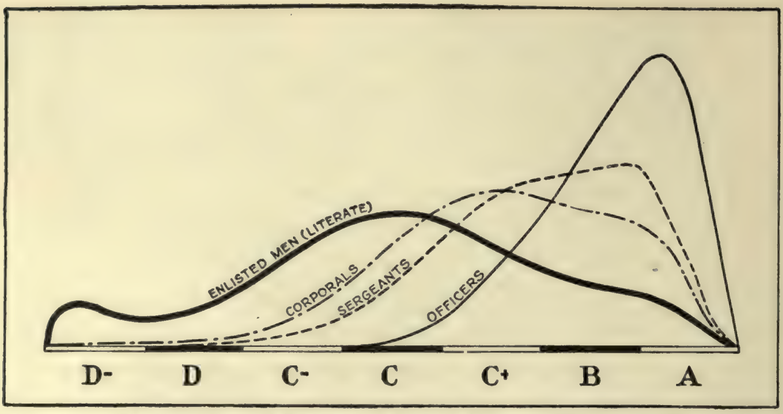

Figure 52. Distribution of Ratings for 82,936 Enlisted Men, 4,023 Corporals, 3,393 Sergeants, and 8,819 Officers

Adapted from Army Mental Tests, Washington, D. C., November 22, 1918, pages 8 and 9.

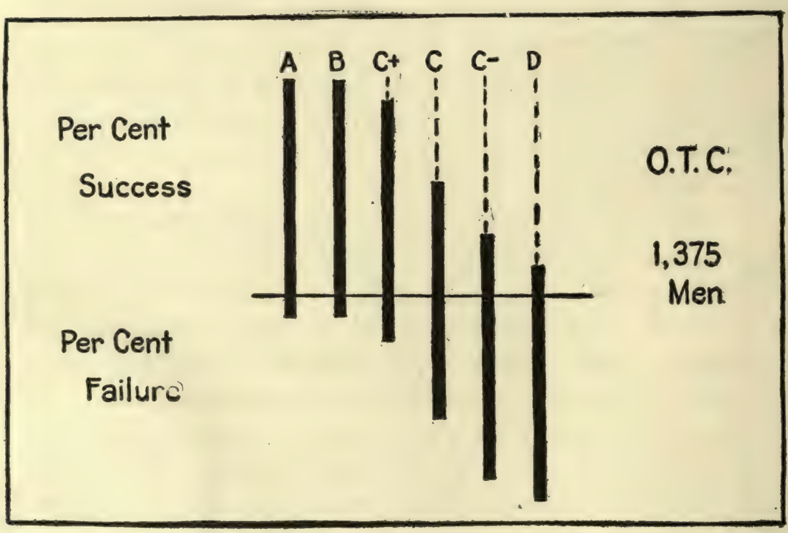

Figure 53. Graphic Representation of Success and Failure of 1,375 Men in the Officers' Training School

Classified according to rating in mental tests.

schools. Of those rated below C, 62.41 per cent were eliminated in the non-commissioned officers' training schools and a much higher proportion in the officers' training schools. (See Figure 53.)

It is only reasonable to assume that much of the retardation and elimination in the public schools, of which a brief account is given in Chapter II, should be attributed to the presence of many children who are mentally and physically handicapped. This by no means exonerates the school for failing to offer the type of work adapted to their needs; it does, however, show the fallacy of placing the entire blame upon teachers and principals who are making the most of the resources at their command.

Inertia Among Workmen

Not only are there groups of persons for whom promotion in the usual sense of the word cannot be planned, but there are also many individuals whose native abilities are considerable who naturally dislike the thought of increased responsibility or a change in occupation or environment. From many points of view, monotony is merely a relative term. A task which may seem monotonous to one worker presents interesting variations to another because of minor changes which occur in styles, materials, tools, and processes. There comes to many workers in mediocre positions a joy in handling high-grade materials, a pleasure in creative workmanship, and a satisfaction in helping to manufacture a product economically valuable, which cannot be appreciated by the ordinary uninitiated outsider. Promotion ought, for these persons, to be safeguarded against tendencies to create dissatisfaction or to overstimulate the worker where nothing is to be gained and much is to be lost by the effort. This ought not, however, to be interpreted in any sense to mean that nothing can be accomplished for these groups by the training department.

As pointed out in Chapter I, this is probably the darkest area of industrial relations, but by no means a hopeless one.

"First-Class Men"

One of the basic principles governing the selection, promotion, and transfer of workers was formulated by Frederick W. Taylor in these terms: "When an establishment has reached an advanced stage of organization, in many cases a fifth element should be added, namely, the task should be made so difficult that it can only be accomplished by first-class men." In answer to criticisms arising from an interpretation of "first-class men" according to the ordinary meaning of the term, thus making it appear that unwise speeding and unemployment of a large number would result from putting the principle into practice, Mr. Taylor offered the following explanation in a hearing before a committee of the House of Representatives:

> I have these two types of "second-class" men in view; the one which is physically able to do the work, but who refuses to do it, and the other who is not physically or mentally fitted to do that particular kind of work, or who has not the mental caliber for this particular job. These are the two types of "second-class" men.
>
> For each man some line can be found in which he is "first-class." There is work for each type of man, just, for instance, as there is work for the dray-horse and work for the trotting-horse, and each of these types is first-class for his particular kind of work. There is no one kind of work, however, that suits all types of men.

Analyzing Each Position

Under any system of management, two steps must be taken to insure an appropriate recognition of first-class service. The first step is to keep systematic records of every man's achievement and progress and to make a periodical

rating of his ability and value to the concern. These records are of such importance as to deserve a separate chapter. The next step is to study work and wages throughout the plant, analyzing each position and its rewards with the following ideals in mind:

1. A standard name and definition for every position. Confusing and unnecessary occupational classifications are probably in use. The Westinghouse Electric and Manufacturing Company condensed an original list of 400 occupations to 170.

2. A grading of occupations into a small number of groups according to the technical knowledge, skill, and experience required and the general value of the job to the company. Five to seven groups have been found sufficient to include all employees in companies employing from 5,000 to 20,000 persons.

3. Maximum and minimum rates fixed for each grade of position. Advancement may take place in three ways:

(a) Increased wages (within fixed limits) on the same job.
(b) Change to a higher grade job in the same department.
(c) Transfer to a higher grade job in another department.

4. Continuous consideration of wage adjustments and promotions rather than leaving them to the first of the year or until complaints are made.

5. Discovery, from a study of the fundamental elements of skill and knowledge and a comparison of elements common to groups or grades of tasks, of:

(a) The natural lines or drifts of promotions.
(b) The training necessary to prepare for advancement.

6. New employees, so far as possible, are to be started on the lower grade positions. This assures:

(a) Better quality of work in these positions since better workers accept them, knowing that they will be advanced in due time.

(b) Longer training before positions of responsibility are entered and better selection of executives.

Standardized Rates and Occupations

Figures 54a and 54b, illustrate the method of recording standardized rates and occupations in use by the Westinghouse Electric and Manufacturing Company. Each foreman is supplied with a set of job analysis cards which give the detailed information regarding every occupation authorized for his department.

The general method of grouping may be illustrated by the following classification used by the Willys-Overland Company for certain positions in the office manager's department (1919):

Class A—Basic rate $75 per month.
  Experienced telegraph operators.
Class B—Basic rate $65 per month.
  Night janitors—54 hours per week.
  Yard men—48 hours per week.
Class C—Basic rate $60 per month.
  Experienced stenographers assigned to central transcription division.
  Day janitors—44 hours per week.
Class D—Basic rate $55 per month.
  Phonograph operators in central transcription division.
  Stock clerks in supply division.
  Elevator operators—48 hours per week.
Class E—Basic rate $45 per month.
  Telephone operators (girls).
  Mailroom clerks (boys with high school education, eligible for promotion into other departments as junior clerks).

JOB ANALYSIS

Card No.......... Sec.......... Dept...

Occupation No.......... Class.......... Name..

Type of Machine Tool
Employee is Required to Operate..

Requirements: Physical, Educational, Experience, Etc.

Man........ | Woman........ | White........ | Colored........	Ability to Speak English..............	Ability to Use Templates..............
Tall........ | Short........ | Medium..............	Ability to Read English..............	Ability to Use Micrometer..............
Minimum Weight.............. | Age Limits..............	Ability to Read Scale..............	Ability to Use Prints..............
Strength and endurance required is more than average..............	Ability to Use Jigs..............	Ability to Set up own work..............
Education Required..............	Ability to Use Gauges..............	

Type of operative required for work } Quick Motioned.......... | Deliberate.......... | Patient.......... | Observant.......... | Good Memory..........

Experience, Time—Previous.......................... | To Learn.......................... | How Taught..........................

Wage System:—Day Work.......... | Premium.......... | Piece Work.......... | Group.......... | Task..........

Tools operative should own..

....

Figure 54. (a) Job Specification Card. (Size $5\frac{7}{8} \times 4$.)

Original on thin white card, punched to place in loose-leaf folders. Each foreman has a file for the jobs in his own department.

NATURE AND DESCRIPTION OF WORK

Work Consists of (Give name of operation and name of apparatus or part. Examples:—Facing Brush Holder Brackets, Dipping Coils, etc.)

....

....

Materials used...

Work is { Heavy.......... | Light.......... | Crane Lift.......... | Hand Lift.......... | Dirty...... | Repetition..........
Wet.......... | Hot.......... | Cold.......... | Outside.......... | Hard for Hands..........

Work Involves { Dust.......... | Fumes.......... | Acids.......... | Oils.......... | Eye Strain..........
Standing...... | Sitting.......... | Stooping.......... | Reaching.......... | More than ordinary accuracy..........

Approximate number engaged on this work, Men.......... | Women..........

Remarks:...

....

....

....

....

....

....

Figure 54. (b) Job Specification Card (reverse)

Class F—Basic rate $40 per month.
  Central file clerks (girls).
  Form typists (girls).
Class G—Basic rate $35 per month (minimum).
  Clerks on folding, gathering, enclosing, and mailing (girls).
  Messengers (girls).
  Matrons (women).

Hindrances to Self-Improvement

One of the most serious criticisms to be made of the wage increases effected through collective bargaining is that they are not evenly or justly distributed. There is rarely any thorough analysis of the whole situation so that service of equal grade receives the same remuneration in every department. Of course, the fault is not peculiar to closed shops or even to industry. The Ohio State Civil Service Commission in standardizing specifications for positions found variations as great as $1,200 between the maximum and minimum paid for doing the same grade of clerical work. No reliable efficiency records were maintained and promotions were based on personal preference or seniority.[2]

Where such conditions prevail, the major incentive to take advantage of the opportunities for self-improvement offered by a training department is destroyed. It is easier to secure advancement and increased wages by finding another job than by striving to prepare for advancement or to improve the quality of the service rendered.

Plans of Promotions—Three-Position Plan

The need for a director of training who co-operates with the employment department in rating employees, in planning promotions, and in devising systematic preparation for ad-

[2] "Standard Specifications for Positions in the Classified Service of the State of Ohio," State Civil Service Commission, Columbus, Ohio, 1917.

vancement, is further evidenced by the failure of the best-known systematic methods of selecting and promoting persons to fill executive positions. Much attention has been attracted by the "Three-Position Plan of Promotion," devised by Frank B. and Lillian M. Gilbreth. It "considers each man as occupying three positions in the organization, and considers these three positions as constantly changing in an upward spiral, as the man is promoted." Each worker teaches a man in the position he has just left and is at the same time being instructed in the duties of a third worker who occupies the position next in line of advancement. Each employee is thus at the same time an instructor, a worker, and a student. The time that he must take to move to the next point in the spiral depends upon his ability to develop efficiency in his pupil and his own aptitude in learning the duties of the next higher position.

This plan is open to the objection that it assumes that every worker is capable of being an instructor. Furthermore, it is quite contrary to the present tendency to relieve workmen and production foremen of the training function. There is a possibility, however, of adapting it to certain kinds of work, particularly positions of an executive nature, where it is difficult to give all of the necessary training through formal classes or special instructors.

The "Understudy" Plan

The so-called "understudy" plan whereby each executive selects one or more individuals who are trained to succeed him also has several manifest disadvantages. Assistants are usually selected because they supplement the ability of the executive, or because they are prompt and accurate in carrying out instructions. The really necessary qualities of leadership are neglected in choosing the understudy and they are not often developed by his experience.

The "Next Step"

Planning promotions has too frequently meant a well-proportioned schematic arrangement which merely outlined the steps leading toward important executive positions at the top of the ladder. In actual practice, transfers and promotions rarely take place along these theoretical lines, nor is it often desirable that they should. Once the tasks in an organization have been analyzed from the point of view of the individual worker's duties and responsibilities, and a classification and grading of positions completed, the possibilities for advantageous occupational adjustments stand revealed. Employees can then be advanced according to related lines of work and from lower to higher grade positions. Departmental lines and the hope of attaining some remote goal become less important. In "Labor Goodwill," John R. Commons says:

> Interest in one's work does not depend on a remote expectation of reaching the top. It is the *next step* that is interesting. The next step means accomplishment; means overcoming obstacles that are not hopeless, means initiative, means thinking on the job. To the mere "intellectual" who ponders over the labor problem, there is no hope if there is no room at the top. Hence efforts to interest workers even in the next step are despaired of. To the business man and engineer whose opinions are formed in mastering the physical sciences, the worker is often preferred who does not think or talk back. But to the educator it is these very qualities which others reject that are his problem to be worked out. They are the psychological problems of industry. If industry has lessened the chances of promotion it is the educator's business to open them up again. He must work out lines of advancement that may serve as a substitute at least for the lost chances of promotion.

Acquainting Employees with Plan

In considering advancement with employees, stress will naturally be laid upon ability and achievement as the primary

considerations upon which rating will depend. Provided this fact is emphasized, and provided employees are warned against the exploitation of opportunities which are largely imaginary, there is no valid objection to the practice of systematically acquainting them with the channels and the methods of promotion.

Among the plans for giving such information which are in successful use by various companies, the following appear to be especially helpful:

1. Conferences with new employees at the time of hiring or when they are followed up by the employment department after beginning work. Job specifications and charts showing the lines of promotion help in making definite, concrete statements.
2. Group meetings with lectures and discussions on efficiency, better methods, and preparation for advancement.
3. Announcement of vacancies with clear statements of the necessary qualifications.
4. Distribution of pamphlets descriptive of the work of the company and containing standard lists of occupations, job specifications written in popular form, and discussions of the opportunities open for self-improvement.
5. Indication of logical promotion lines when an employee is encouraged to undertake a special course of study or enter a training class.
6. Announcement of promotions in the plant journal or house organ, giving brief life histories of specially significant cases.

Vocational Guidance—The Part of School and Industry

The relation of school and industry to the broad problems of vocational guidance, as they have been discussed in this

and the preceding chapter, may be summarized under the following topics:

For the school, this work implies:

1. Broadening the child's occupational horizon through an educative process.
2. Assistance and advice in selecting a vocation and making the right preparation for it.
3. Placement.
4. Employment supervision.

For industry, vocational guidance implies:

1. Careful initial selection of workers.
2. Supervision of transfers and promotions in the light of personal qualifications.
3. Records and objective rating of all employees.

The technical problems involved in this work are already fairly well formulated, but the administrative details are not yet completely worked out.

CHAPTER XV

RATING EMPLOYEES

Necessity of Rating Method

The efficiency of any promotion scheme depends in large part upon the availability of complete records regarding each individual in the organization. Even in companies where employment management practice is fairly well standardized, it is uncommon to find any objective method for determining the relative abilities of those who comprise the rank and file of the organization. In concerns where less attention has been given to keeping personnel records there is usually no source to which one can turn for information upon which to base wage increases, decisions as to transfers or promotions, the selection of persons to fill emergency positions, or recommendations to other employers.

As more provisions are made for training employees, and as the necessity for promotion machinery becomes more urgent because of the company's increase in size and the consequent loss of personal contact between workmen and higher executives, the need for some form of merit-rating or record of achievement becomes increasingly apparent. In what follows some account will be given of experiments in this direction which have proved satisfactory in various concerns, and certain principles, outgrowths for the most part of psychological research and educational experience, will be set forth.

Rating Apprentices

1. *Brown and Sharpe Company.* Nearly all apprentice or corporation schools have some formal method of rating or

grading their apprentices. This is necessary not only to weed out undesirable students but also to give some basis for checking up those who are failing in their work in order that they may be given individual instruction. Thus the apprentice school maintained by the Brown and Sharpe Manufacturing Company of Providence, Rhode Island, requires from the foreman a report for each apprentice under his charge on industry, workmanship, deportment, and judgment. In case the apprentice is not doing satisfactory work, a special report is made in the manner indicated in Figures 55a and 55b. Whenever such a deficiency report is received by the supervisor of apprentices, he either transfers the boy to some other job or endeavors through special instruction to bring him up to a passing standard.

2. *Westinghouse Company.* The Westinghouse Electric and Manufacturing Company, of East Pittsburgh, Pennsylvania, requires department heads to render a report on apprentices under their care, using a form (Figure 56) which supplements a more complete apprentice record maintained by the training school. It includes marks for attendance, speed, neatness, accuracy, memory, reasoning power, observation, effort, and aptitude for academic classes in drawing, English, and mathematics, as well as a tabulation of the amount of time spent on each class of operation and total earnings on productive work.

Another firm makes use of the form shown in Figure 57, upon which is plotted the daily wage, thus giving a graphic picture of the development of the earning capacity of the student.

3. *Plan of H. F. Markus.* The form shown in Figure 58 was devised by H. F. Markus, a teacher of electrical work at the Arsenal Technical Schools, Indianapolis. It gives a daily record of the pupil for five weeks, together with the necessary identification data. During the shop period, each

APPRENTICE PIECE-WORK DEFICIENCY REPORT

This form must be filled out for all contracts on which the apprentice does not exceed his hour pay and forwarded to the Supervisor of Apprentices at once.

Name E. F. Mehring Reg. No. 11-A101

Name of Part Quill Sh. Bush Front Symbol No.

Drawing No. No. of Pieces 70

Rate .05 Amount $3.50 Hours 20.7 Rate per Hour .169

Date 8-20 1918 J. W. McGregor M. FOREMAN

Over Interviewed 9/20/18 Z. R. J.

Figure 55. (a) Form for Report on Apprentices. (Size 6×4.)
Used by Brown and Sharpe Company to report progress of apprentices.

PREVIOUS RECORDS ON THIS JOB FOR COMPARISON					
Name	Number of Pieces	Rate	Amount	Hours	Average per Hour
T. Haworth	155	.05	$7.75	30	.258
G. M. Mitson, (man)	138	.055	$7.59	19.4	.391
J. Johnson (man)	165	.055	$9.08	25.3	.358

Figure 55. (b) Form for Report on Apprentices (reverse).

APPRENTICE RECORD

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

Name.................................... Section..................

Machine Tool or Work

______	Speed. The rate at which he works as compared with the speed expected.
______	Workmanship. The grade of the finished work as compared to standard practice.
______	Attitude. Personal interest shown in his work and his conduct toward superiors and fellow-workmen.
______	Knowledge. The amount of general information he has, in line with his work.

A = Very Good   B = Average   C = Unsatisfactory

In what does this man excel?...
....
....

In what is he deficient?...
....
....

Signed.................................... Date.................

NOTE—Send to Educational Department

Figure 56. Apprentice Record Form

Used by Westinghouse Electric and Manufacturing Company.

pupil keeps his card in a special pocket in his tool-box so that it is easily available for reference. A daily record of the kind of work done is kept on the reverse of the card by the student. At the end of the period, the instructor gives

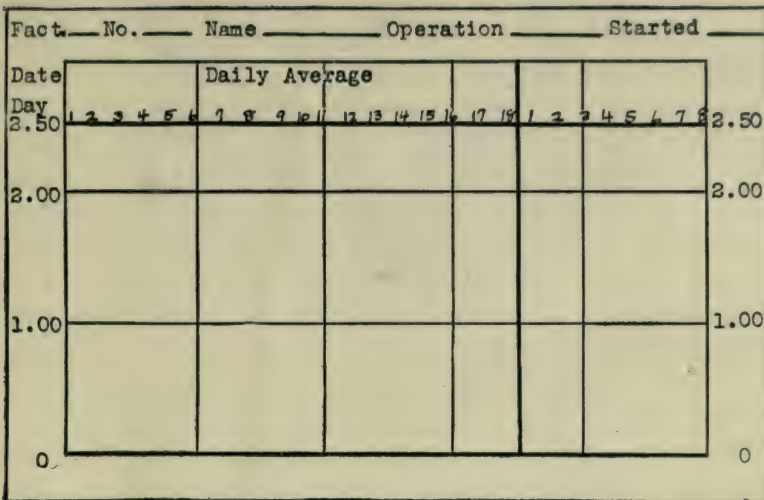

Figure 57. Form for Charting Earnings of Apprentices

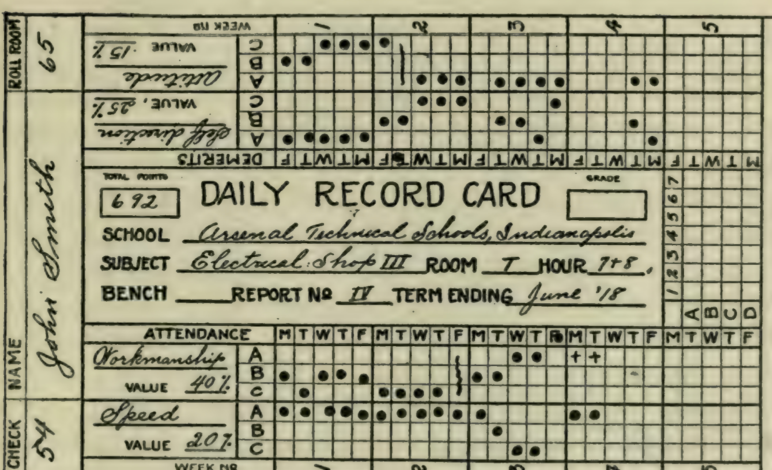

Figure 58. Record Card for Shop Students. (Size 5×3.)

Used in the Arsenal Technical Schools, Indianapolis. Courtesy of Professor D. J. McDonald, Indiana University.

a grade on each of the four points mentioned, the marks being indicated by a punch. Exceptionally good marks are shown by a plus sign, and a very poor record by a vertical line. In computing the total number of points, A+ counts 10; A, 9; B, 8; C, 7; and D, 5 points. "Absence" counts O, and "demerits" count −8. All the grades for a given factor are added up, as for example "workmanship" which totals 126; since workmanship has a value of 40 per cent, the pupil receives 40 per cent of 126, or 50.4 points. The total is secured by treating each factor in the same way and adding the several totals.

This form has the disadvantage of requiring too much bookkeeping in finding the totals, but it suggests a method by which the daily rating can be given with economy of time and with entire frankness on the part of the instructor. The extra space at the right of the card may be used for recording special grades on projects or items to be added or subtracted on account of absence or special work.

Rating Department Store Employees

Many of the department stores have developed a technique quite as interesting and valuable as that which is to be found in the apprentice schools. As a rule two fundamental matters are used as the basis for rating salespersons—the number of errors and the amount of sales. It is clear that training, length of service, the location of the department, assistance from superiors, and the season of the year are only a few of many factors which may affect the efficiency of an employee in a retail establishment through no fault of his own.

1. *Lord and Taylor.* At Lord and Taylor's in New York City recognition has been made of this point of view and a better basis for rating has been devised. The store co-operates with the public schools in maintaining continuation classes for all persons under sixteen years of age, and in addition carries

on a considerable number of educational activities. The head of the instruction department has been selected to supervise the rating of certain employees. This official interviews each person hired and arranges for him to be sent for a period of preliminary training in the "System Room," where from one to two hours' instruction is given in the use of forms and some time is spent in discussing store policies and standards. Those who enter the sales force come back for three succeeding mornings for an hour's instruction. All the younger workers are assigned to some one of the regular classes after passing this period of preliminary instruction in store methods.

2. *Reporting Errors.* A complex system of reporting errors has been built up around which much of the instruction centers. For each department there is a classified list of possible errors, each room being denoted by number. A total of nearly 115 different forms of complaints and mistakes has been listed. Anyone who discovers that an error has been made reports it at once on a special blank provided for the purpose. A bonus of five cents for each error discovered is allowed to packers, clerks, and others who are in a position to detect a considerable number of errors. The head of the instruction department and certain of the instructors hold private conferences or meet employees in groups for the purpose of giving instruction in the best methods of avoiding blunders. Special complaint and service meetings, presided over by the head of the instruction department, are held in the several departments at 8:30 in the morning. It takes about two months to complete the round of the store at the rate of four meetings per week. In addition to talks based on summaries of the errors for the department, these conferences also consider general salesmanship principles or the special problems of the group in question. To assist in this work, a weekly tabulation is made in the instruction department of all errors reported from each division of the store.

3. *Rating by Floormen and Buyers.* The form shown in Figure 59 is sent out monthly to all floormen and buyers, who rate each individual coming under their attention. These reports are then transcribed, the one from the floormen in red, and that from the buyer in black, to the loose-leaf ledger sheet, part of which is shown in Figure 60. The report on

If in your opinion the Salesperson's rating is Excellent, mark "5" Good, " "4" Fair, " "3" Poor, " "1" Bad, " "0"	Health	Appearance	Manner	Initiative	Industry	Accuracy	Loyalty	Co-operation	Responsibility	Knowledge	Total	Dept. Date
Names of Employees												

Figure 59. Form for Reporting on Department Store Salespersons

Used by Lord and Taylor's, New York City. Filled out by floormen and buyers.

the employee's health is secured from the medical department, "industry" is rated from the number of sales, and "accuracy" is largely a question of the number of errors which the employee makes.

When this method was first instituted, the results were quite unsatisfactory, but through a period of instruction in which the floormen and buyers were brought together for conferences and were led to see the importance of their rating and were helped to arrive at common standards, the reports were greatly improved. As a rule the foremen send in better reports than do the buyers, since they are more likely, because of their experience, to look for service from the employee instead of sales alone.

NAME ADDRESS

AGE

		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	
DATE ENG. AND ACCT. CLSED.	1916													
	1917													
	1918													
SALARY	1916													
	1917													TOTAL
	1918													
DEPT.	1916													
	1917													
	1918													
HEALTH 5	1916													
	1917													
	1918													
APPEARANCE 5	1916													
	1917													
	1918													
SALES—B- 30 C- 15 45	1916													
	1917													
	1918													
TOTAL	1916													
	1917													
	1918													

	Amt. of Sales			Percentage			Credits			Number of Sales			Errors			Times Late		
	1916	1917	1918	1916	1917	1918	1916	1917	1918	1916	1917	1918	1916	1917	1918	1916	1917	1918
JAN.																		
FEB.																		
MAR.																		

Figure 60. Section of Loose-Leaf Form for Recording Ratings. (Size $9\frac{7}{8} \times 6\frac{1}{8}$.)
Used by Lord and Taylor's department store, New York City.

Rating Operators

1. *Western Union.* In some respects the efforts of the Western Union Telegraph Company and of certain of the telephone systems to discover errors and to rate employees are not unlike the methods in use in the department stores. Particularly with telegraph transmission by the Morse method, examination for quality of production must be made at the actual time the message is transmitted, as a complete inspection cannot be readily effected at a later date. In this respect, at least, the problem differs from that of a factory, where the quality of production can be easily determined after the completion of the manufacturing process, and resembles the condition in the department store, where the fault of the salesperson may lie very largely in his manner of treating a customer, thus making it necessary to base any rating upon direct observation at the time a sale is attempted.

In order to secure unbiased results the Western Union Telegraph Company makes its observations of each operator's work secretly in a specially equipped observing-room. The fact that observations are made is a matter of general knowledge to all operators, but the time at which they are observed individually is kept secret and so varied as to insure representative results. Errors and potential errors, deviations from established operating practice, wastes of time or failure to challenge obvious errors of others, are noted on the operator's record from the observation of the actual sending and receiving. (See Figure 61.)

The supervisors are kept advised of the results for the operators who are under their authority, and at intervals the operators are shown their records and suggestions are made as to ways in which their work can be improved. It is the belief of the company that employees should be advised of favorable results as well as those which are not satisfactory. Attendance is recorded in detail and closely associated with

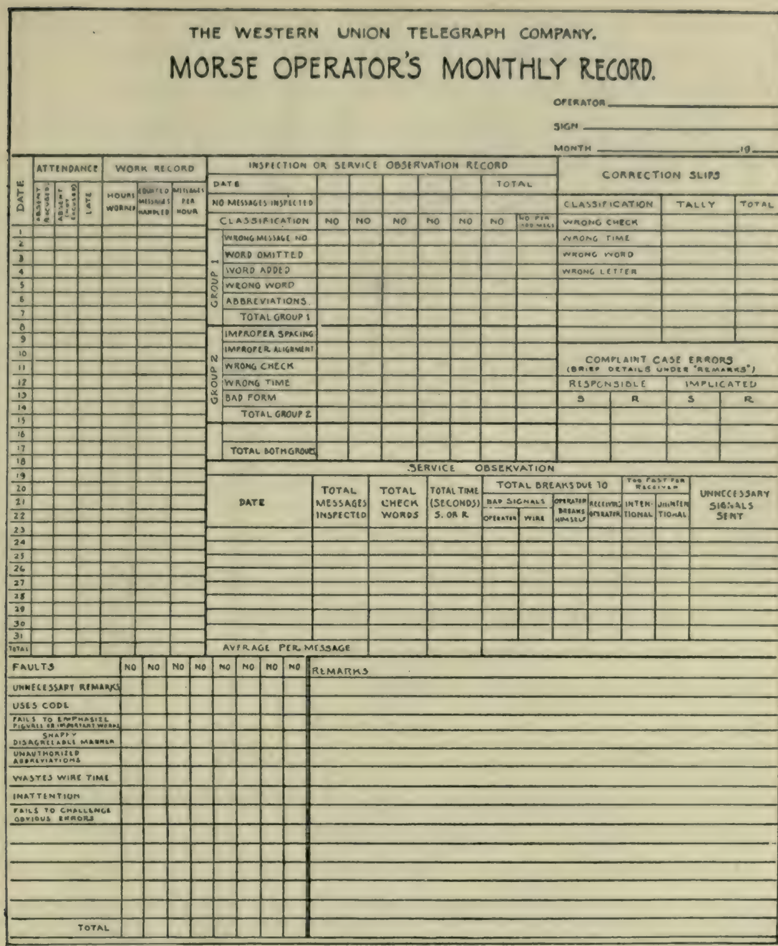

Figure 61. Form for Recording Efficiency of Telegraph Operators. (Size 8⅜×10⅛.)

this is the working capacity of the employee as shown by the number of hours at work, the total production, and the average hourly rate. These records form the basis of all salary increases and promotions. The supervisor is asked for a recom-

mendation on general points regarding the employee's conduct and qualifications, but the observer's record is used to determine the quality and quantity of the work performed.

2. *Bell Telephone System.* No general practice of this kind is now in effect in the Bell system. Records of attendance of employees are kept regularly for all except supervisors, managers, and officials. New employees in the clerical, operating, and planning departments, which include 95 per cent of the total force, are generally given a more or less thorough medical examination before employment. Inspection of the work of both plant and traffic employees is done for instruction and training purposes; and although the results of such inspection are, of course, a factor in considering the advancement of employees, such records are neither made nor used for the purpose of deciding promotions or wage increases. With respect to the operators' wages, increases are based almost wholly on the length of service and the general satisfaction given by their work, while promotions are based entirely upon fitness for greater responsibility according to the judgment of responsible officials.

Rating Clerks

1. *State of New York.* Several attempts have been made to standardize the work done by clerks and stenographers. An example of such a rating is offered by the form shown in Figure 62 used by the State Industrial Commission, Albany, New York. Four ratings are made each year by the heads of bureaus and divisions for each person coming under their observation. These reports are filed in the office of the secretary and after receiving his approval are submitted to the employees for examination. If an employee feels aggrieved, he may appeal to the Committee on Review at any time within ten days. The Committee on Review consists of nine officers of the State Industrial Commission, including the Secretary

EFFICIENCY RATING CARD
1917–1918

NAME.................... TITLE.................... SALARY..................
BUREAU.................. DIVISION................

NOTE: Use no intermediate percentages. Ratings above or below standard must be explained on back of card. (Use black ink.)

Factors to be Rated		Fixed Percent-ages	Ratings for periods Ending			
			1917 12/31	1918 3/31	1918 6/30	1918 9/30
QUANTITY To include Volume of work Industry Speed	Far above standard Above standard Standard Below standard Far below standard	44 40 36 32 28				
QUALITY To include Thoroughness Accuracy Neatness Orderliness	Far above standard Above standard Standard Below standard Far below standard	44 40 36 32 28				
PERSONALITY To include Appearance Tact Willingness Courtesy	Above standard Standard Below standard	12 8 4				
Total........................						
(To be filled in by the Committee on Review if rating is modified) (*Red Ink*) Total						
Demerits Demerits for Lateness and Absence		Percentage Deducted				
(To be filled in by the Secretary) (*Red Ink*)		Final Rating				

CERTIFICATIONS

The ratings were made under my directions and are hereby approved. Quarter ending 12/31/17 Quarter ending 3/31/18 Quarter ending 6/30/18 Quarter ending 9/30/18 ***Head of Bureau or Division***	The ratings hereon are modified as above. Quarter ending 12/31/17 Quarter ending 3/31/18 Quarter ending 6/30/18 Quarter ending 9/30/18 *Chairman Committee on Review*

Figure 62. Rating Scale for Office Employees

Used by State Industrial Commission, Albany, N. Y. Reverse side of the rating card contains space for explanations for each quarter of the year.

EMPLOYEE'S REVIEW BLANK

NAME .... Class .... Position ....

Department .... Division .... Section ....

Date Appointment .... Date Birth ....

Present Annual Salary $ .... Maximum for Position $ ....

Date of last Increase .... Times late absent during past twelve months ....

DUTIES

		CHECK IN SQUARE AND GIVE BELOW DETAIL OF POSITION		
Supervises	......		......	.... "Snags"
Analyzes	......		......	.... Assembles
Audits	......		......	.... Tabulates
Approves	......		......	.... Posts
Translates	......		......	.... Typewrites
Investigates	......		......	.... Writes
Inspects	......		......	.... Indexes
Checks	......		......	.... Files
Dictates	......		......	.... Operates
Prepares	......		......	.... Punches
Reviews	......		......	.... Draws
Compares	......		......	....

WORK: Accuracy .... Appearance .... Amount Accomplished .... General Ability ....

MENTALITY: Intelligence .... Memory .... Initiative .... Alertness ....

Reliability .... Quickness to Learn .... Interest in Work .... Adaptability ....

DEPORTMENT: Attention to Work .... Courteousness .... Personal Neatness ....

NOTE: RATE ABOVE AS FOLLOWS: 1 MEANING "ABOVE THE AVERAGE," 2 MEANING "AVERAGE," 3 MEANING "BELOW AVERAGE."

REMARKS. (Frank expression of opinion from head under whom clerk is working as to faults, bad habits etc.)

Recommend increase in above case to $ .... per annum.

Recommend change of Class from .... to ....

Approved Meeting .... Increase effective ....

Approved .... FOR THIRD VICE PRESIDENT .... HEAD OF BUREAU OR DEPARTMENT

Figure 63. Review Blank for Employees' Ratings. (Size $8\frac{3}{8} \times 10\frac{7}{8}$.)
Used by a life insurance company for ratings made by section chiefs.

and the Director of the Employment Bureau. If upon appeal the efficiency rating is not revised or modified by the committee, it stands approved. Demerits are given for unexcused lateness or absence, and 1 per cent is deducted from the final efficiency rating for over six demerits.

2. *Equitable Life Assurance Company.* Clerks in the employ of the Equitable Life Assurance Company are divided into five classifications, each classification receiving a specified amount. Ratings are originally made to the head of the department by representative section chiefs and from these ratings review blanks (Figure 63) are filled out by the head of the department. Whenever a clerk reaches the maximum for the class for which he is employed, he is rated as being eligible for advancement to the next class, either in his own or some other department. Executives in authority try to keep the lines of promotion constantly open and to weed out those who do not qualify for advancement.

3. *Norton Grinding Company.* The simplest expedient for rating operatives in common use is that of sending a special form to the foreman, upon which the employee is rated on several general characteristics. The Norton Grinding Company at Worcester, Massachusetts, carries this a step further by asking for a rating from the foreman which is supplemented by a rating given by a representative of the employment department. The points covered are "Principal Work Done Since Last Report," "Adapted to Work," "Sufficiently Trained," "Attitude Toward Work," "Capable of Filling Better Position," "Special Aptitude," "Promptness," "Accuracy," "Capacity for Team-Work."

CHAPTER XVI

STANDARDS FOR RATING SCHEMES

Elements of Correct Rating Method

It is apparent that several difficulties stand in the way of maintaining records which will adequately serve the purposes outlined in the last chapter. To decide upon the matters which should become a part of a permanent record is not easy, nor can the foremen and department heads in the usual establishment be persuaded to agree upon standards of judgment without first laying a considerable educational foundation for their guidance.

As a rule the individual record is left as a matter of personal responsibility with the foremen or department heads. Certain records are likely to be on file in the employment department, such as the medical examination record. The rating as to attendance and earnings is kept by the foreman. Aside from these items the foreman is more than likely to fail to keep any written account which is at all dependable. All this leads to confusion in record-keeping and a division of responsibility in arranging promotions, transfers, or wage increases.

The most difficult problem is probably that of discovering a series of matters regarding which a record can be made which will conform to the following requirements:

1. The record must be objective and capable of standardization; that is, it must not be open to wide variations owing to prejudice or personal opinion, and it must be capable of being measured in terms of some standard of measurement. The earnings on piecework or the record of attendance offer ex-

amples of records of this kind. They are readily interpreted, and it is possible to enumerate them without a chance of serious error.

2. It should be possible to compile the record without too great an outlay of expense for clerical assistance.

3. The system of marking should be readily intelligible both to employees and executives. It should be accessible to the person rated and should inform him as to his success or failure in terms of his daily routine.

The following list is suggested as offering examples of matters which in the main conform to these standards:

1. Attendance. Includes record of absence and tardiness, with reasons where excuses are presented.
2. Length of service.
3. Record of production. May include earnings on piece-work, sales, or the amount of work accomplished.
4. Health record. Includes the preliminary medical examination with any subsequent treatments or examinations, together with lost time due to illness or accidents.
5. Suggestions or initiative. A list of constructive criticisms or suggestions made by the employees.
6. Errors. A record of mistakes or waste of material.
7. Maintenance of tools or machinery used by employee. Includes a record of accident or breakage. Some companies having a stable labor force of skilled operators keep a maintenance account for each machine which shows the operator's relative efficiency.
8. Department or job transfers. The number of changes from one position to another, together with the reasons for transfer.
9. Discipline. An account of any complaints made by fellow-employees or supervisors, together with the

disposition of each case. May include record secured from outside sources of misbehavior outside of the plant.

10. Leadership. Record of positions held or responsibilities accepted, such as special work on committees, employees' association, or on similar work outside of company.
11. Training or education. A statement of preliminary education plus any instruction received after entering the company's employ, such as attendance at evening classes, correspondence courses, special trips, conventions, and systematic reading.

Plan of National Cash Register Company

The National Cash Register Company has endeavored to meet some of these requirements in its practice, as the following account, furnished by an executive of the company indicates:

> We keep careful records of attendance of each employee, and when he is being considered for promotion or wage or salary increase his attendance record is consulted.
>
> We have had a suggestion system in operation for a number of years, and it has accomplished much in the way of stimulating our employees in thinking along original lines. All employees are urged to send in suggestions and complaints. The employment manager keeps a list of prize winners in the suggestion contests, and when there is a vacancy for which two men of equal ability are being considered, their records of adopted suggestions are taken into consideration.
>
> Another point which has considerable weight in determining promotions and increases is the employee's record of attendance at our night classes, which are conducted during the winter months, and include such studies as accounting, salesmanship, public speaking, shop mathematics, stenography, typewriting, etc. If an employee shows an interest

in improving himself along educational lines, he will be given preference when considered for promotion or increase.

Every employee is required to pass a medical examination before starting work. This examination is made by the company physician. The company conducts noon-hour meetings, issues bulletins, etc., in an effort to educate all employees along the lines of health.

In our factory, we have a minimum and maximum wage-scale for all positions. Generally the employee is hired at the minimum rate and the foreman in the department has the authority for suggesting increases as the man increases his efficiency on the job. The foreman, however, cannot raise a man above a certain maximum unless by special authorization.

All increase slips, both factory and office, are passed upon by the employment manager, after being proposed by the foreman or department head and being O.K.'d by the supervisor or superintendent.

This company issues to department heads a very complete statement of its standards for rating, together with an explanation of all of the terms used. The report received quarterly from department heads contains a rating for each employee on "health," "mentality," "industry," "knowledge," and "effectiveness." Each of these terms is given a maximum weight of 20 points, the total maximum rating thus being 100. The following schedule is used in governing the efficiency marking:

Above 85	Exceptional; excellent.
Between 85 and 80	Good, or thoroughly satisfactory.
Between 80 and 75	Good, but not thoroughly satisfactory.
Between 75 and 70	Fair.
Below 70	Poor; on probation.

When a marking above 90 or below 70 is reported, the department head must give facts in justification of same. No

marking above 90 or below 70 is entered on the employment record until this explanation is received.

Plan of Burroughs Adding Machine Company

The Burroughs Adding Machine Company, of Detroit, Michigan, maintains record cards, especially in connection with their general office force, which appear to conform somewhat more closely to the standards mentioned above. The record includes all of the ordinary information usually kept concerning employees, such as the name, address, date and place of birth, transfers, and salary changes. In addition, a space is provided for a record of the successful completion of any educational effort on the part of the employees. The employment department is expected to keep an up-to-date account of the employee's ability to do work different from that for which he was originally hired, or to which he is assigned at the moment. The reverse side of the record card is left blank for notes which are made from time to time concerning anything of significance which may occur. By the use of a "recommendation for increase" form, a periodical opinion in writing is secured from each department manager concerning the class of work being done and progress attained by each person under his supervision.

Danger of Inaccuracy—Harvard Example

There are several general principles which should govern any form of efficiency rating. The most obvious failures arise out of the inability of those who make the ratings to formulate for themselves standards of achievement or ability. Striking examples of the wide divergence in markings which are sure to occur, even on material which has been subjected to scrutiny over a long period of time and among persons who are well trained in doing just this kind of work, may be drawn from the experience of educators. An examination of the teaching

in the Division of Economics at Harvard University was completed by the Division of Education of that university in September, 1916. It includes a study of marks given by seven instructors who graded ten mid-year examination books. In each book there were ten answers, and each instructor gave a separate mark for each answer as well as a mark for the book as a whole. All of the questions proposed in the examination were asked in such a way that there could be no fundamental disagreement as to the statement of fact involved in any given answer. Figure 64 shows how widely the instructors varied in their estimates of the ten books.

No. of Book	Highest Mark	Lowest Mark
1	95	75
2	81	69
3	81	66
4	88	60
5	85	65
6	84	62
7	71	57
8	69	50
9	63	46
10	47	28

Figure 64. Table Showing Variation in Ratings

Range of marks given by seven Harvard instructors on ten examination books in economics. "The Teaching of Economics in Harvard University," Harvard Studies in Education, Vol. III, Harvard University Press, page 196 ff.

Even greater variations appear in marking the separate questions. Only one answer out of the hundred which appeared in the ten books was given the same mark by all seven instructors; and there were only seven cases where five or more professors agreed upon the rank to be given a question. Variations in marking were found to be so great that under certain circumstances a professor's tendency to mark high or low could determine a man's success, not only in attaining a degree with distinction but even in securing his A. B. degree.

Similar discrepancies are to be found in the marks of school teachers everywhere. Extreme differences appear in the judgments of any group of instructors who are asked to mark the papers of students in any subject. It may therefore be expected that much greater differences will appear in judging persons in such abstract or complex matters as "personality," "initiative," "co-operation," or "general value to the concern."

Officer Rating—United States Army

Several methods suggest themselves by which this tendency can be overcome. The United States Army has made use of a method of rating officers which offers a fairly successful solution. Each rating officer makes out his own scale in the following manner. Five general headings have been selected under which the ratings are given. Under each of these heads the rating officer places the names of five officers of his acquaintance, arranging their names in order as shown in Figure 65. In rating subordinates the officer then compares any given case with the men whom he has selected as his standards. To obtain the total rating for a subordinate, his ratings in the five separate qualities are added up. Anyone who equals the "highest" officer in the rating-scale in all of the five characteristics thus receives a total of 100 points, and one who equals the "lowest" receives only 20 points.

Because this scale calls attention separately and consecutively to each of several essential qualifications for an officer, it lessens the danger that judgments may be based on minor defects with a corresponding disregard of important characteristics. Officers are especially asked to avoid the error of rating low in all characteristics a subordinate whom they hold in disapproval for any reason, or high in all characteristics a subordinate whom they admire for any special cause.

I. PHYSICAL QUALITIES. Physique, bearing, neatness, voice, energy, endurance. Consider how he impresses his command in these respects.	Highest: *Capt. John Doe*..........15 High: *Capt. H. Black*.............12 Middle: *Capt. R. White*........... 9 Low: *Capt. W. Smith*............. 6 Lowest: *Capt. E. Jones*.......... 3
II. INTELLIGENCE. Accuracy, ease in learning; ability to grasp quickly the point of view of commanding officer, to issue clear and intelligent orders, to estimate a new situation, and to arrive at a sensible decision in a crisis.	Highest: *Capt. R. White*..........15 High: *Capt. B. Gray*..............12 Middle: *Capt. W. Smith*.......... 9 Low: *Capt. J. Brown*............. 6 Lowest: *Capt. E. Jones*.......... 3
III. LEADERSHIP. Initiative, force, self reliance, decisiveness, tact, ability to inspire men and to command their obedience, loyalty and co-operation.	Highest: *Capt. B. Gray*...........15 High: *Capt. John Doe*............12 Middle: *Capt. R. White*........... 9 Low: *Capt. W. Green*............. 6 Lowest: *Capt. R. Blue*........... 3
IV. PERSONAL QUALITIES. Industry, dependability, loyalty; readiness to shoulder responsibility for his own acts; freedom from conceit and selfishness; readiness and ability to co-operate.	Highest: *Capt. H. Black*..........15 High: *Capt. W. Smith*............12 Middle: *Capt. R. White*........... 9 Low: *Capt. A. Old*............... 6 Lowest: *Capt. J. Young*.......... 3
V. GENERAL VALUE TO THE SERVICE. Professional knowledge, skill and experience; success as administrator and instructor; ability to get results.	Highest: *Capt. R. Day*............40 High: *Capt. H. Night*.............32 Middle: *Capt. R. Roe*.............24 Low: *Capt. A. Old*................16 Lowest *Capt. R. Blue*............. 8

Figure 65. The Rating Scale Card

Used by the United States Army for rating officers.

Anything which contributes to clear definition of the virtues to be measured or the points to be considered will be important in bringing about a closer agreement in the rating given by several different observers. This point has already been touched upon in what has been said above with respect

I. TRADE ABILITY. Compare nature and extent of trade experience; skill in using tools or machines; technical information; knowledge of related trades or processes.	Highest .... 15 High .... 12 Middle .... 9 Low .... 6 Lowest 3
II. PRODUCTION. Compare ability to plan and get work out on schedule time; production costs; maintenance of department; quality and quantity of output.	Highest .... 25 High .... 20 Middle .... 15 Low .... 10 Lowest 5
III. ADMINISTRATION. Compare tact and fairness in dealing with employees; success in making occupational adjustments; discipline; esprit de corps of employees; special efforts to build up a stable working force; sanitary condition of department; accident record.	Highest .... 30 High .... 24 Middle .... 18 Low .... 12 Lowest 6
IV. TRAINING. Compare willingness and ability to teach beginners; efforts to improve employees through instruction; co-operation with training department.	Highest .... 15 High .... 12 Middle .... 9 Low .... 6 Lowest 3
V. SPECIAL EXECUTIVE QUALIFICATIONS. Compare years of service; loyalty; knowledge of company's policies; co-operation with other departments and with higher executives; promptness and accuracy in making out reports; initiative; resourcefulness; self-control.	Highest .... 15 High .... 12 Middle .... 9 Low .... 6 Lowest 3

Figure 66. Rating Scale for Foremen

to suitable points upon which to base the rating-scale. It is further emphasized by the scale shown in Figure 66, which is based in part upon one proposed by P. J. Reilly of the Den-

nison Manufacturing Company for rating foremen. Definite points with respect to the foreman's task are enumerated, the rating being accomplished in the same way as described for the army officer's rating-scale.

Suggestions for Increasing Accuracy

The few experiments made by psychologists which can throw light on the qualities that should be listed in an executive's rating-scale seem to indicate that there is some divergence in the ability to judge a trait in others according to whether or not one possesses it himself. A man's judgment, for instance, of neatness, intelligence, humor or refinement in others is likely to be reliable if one possesses these traits. On the other hand, vulgarity, snobbishness, and conceit in the rating officer render his judgments of these characteristics in others quite unsatisfactory. In the same way it appears that there is a fairly close agreement as to judgments of efficiency, originality, or quickness, while there is likely to be little or no agreement among observers as to such traits of character as unselfishness, integrity, co-operativeness, cheerfulness, or kindliness.[1]

1. *"Five-Division" Scale.* The experience of educators has quite clearly demonstrated the futility of attempting to mark on a scale of more than ten divisions. Five divisions are probably enough for all practical purposes and are certainly within attainable limits of accuracy. Such considerations as the wide differences in the grades given by several teachers in marking the same material, and the variations in the grades given by the same teacher in marking similar material on different days, show the errors involved in marking in terms of percentage, using 50 or 100 points. If the marks for any large, unselected group of students are placed in five divisions according to rank, they tend to follow the

[1] *Cf.* Hollingworth, "Vocational Psychology," pages 139-160.

curve of probability or chance distribution referred to on page 248. This would give 2 per cent of the group a rating of A, 23 per cent B, 50 per cent C, 23 per cent D, and 2 per cent E, where A represents exceptionally high scholarship and E a failure. Those who fall in the A or B class will be slated

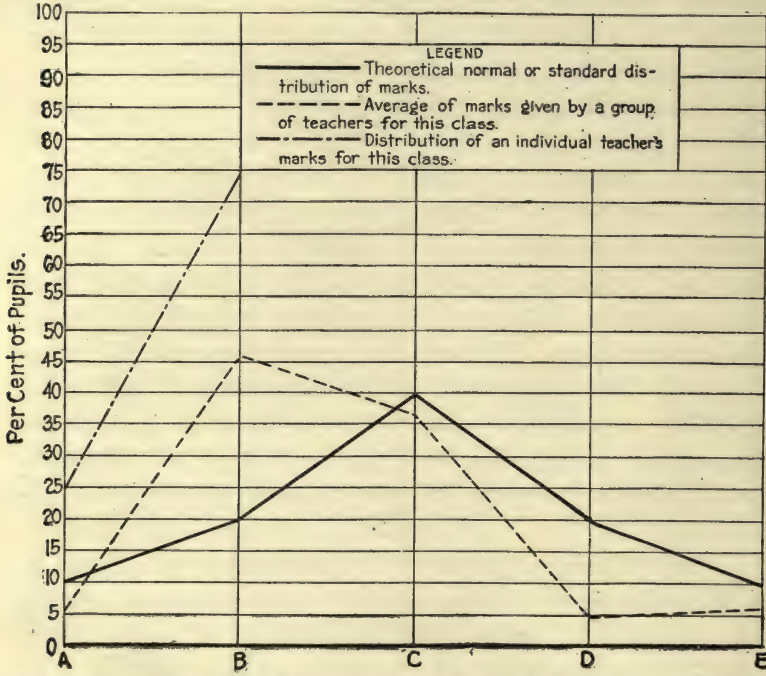

Figure 67. (a) Graphic Representation of Teacher's Ratings — Teacher Marking too High

for advancement, while those in the D and E groups must have individual help or drop out. The effort to assign only four grades instead of five implies that the large middle group must be divided, and this is not desirable for any purpose, either in the school or in the shop, since those who comprise it are doing fairly satisfactory work.

2. *Use of Charts.* Supervisors can be aided in attaining

common standards for rating and in appreciating what is involved in a just distribution of grades by the use of charts similar to those shown in Figures 67a, 67b, 67c. Figure 67a shows the distribution of marks given by a teacher who was marking too high; Figure 67b, one who was inclined

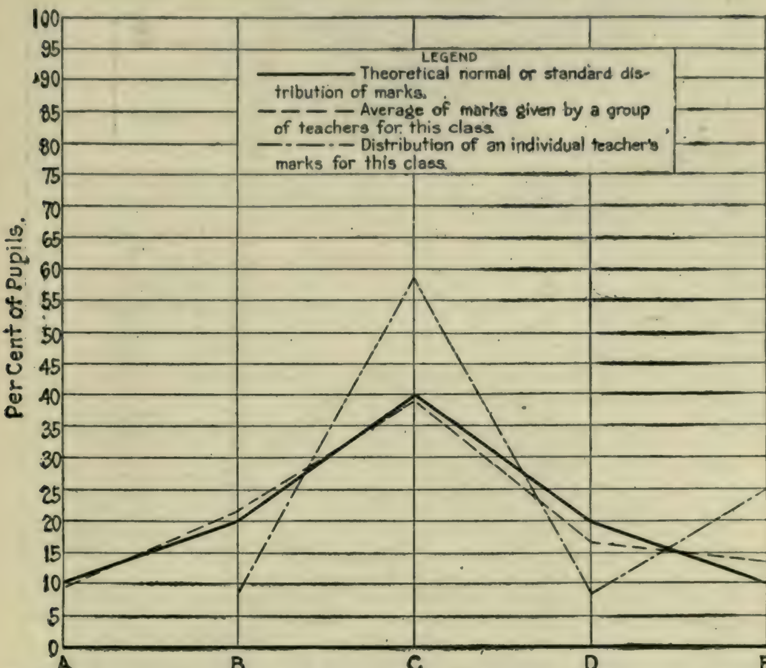

Figure 67. (b) Graphic Representation of Teacher's Ratings—Teacher Marking too Low

to mark too low; while Figure 67c shows a nearly normal assignment of grades.

The "normal" distribution suggested in these diagrams is not that of the so-called "probability curve," but a modification based on the study of many school marks made by Professor Cattell, formerly of Columbia University. It comes somewhat nearer the actual facts than the theoretical curve.

3. *Self-Questioning.* It is not likely that many groups of employees will fall readily into normally distributed groups, especially where only a few persons are being rated, but any considerable deviation from the theoretical curve should cause

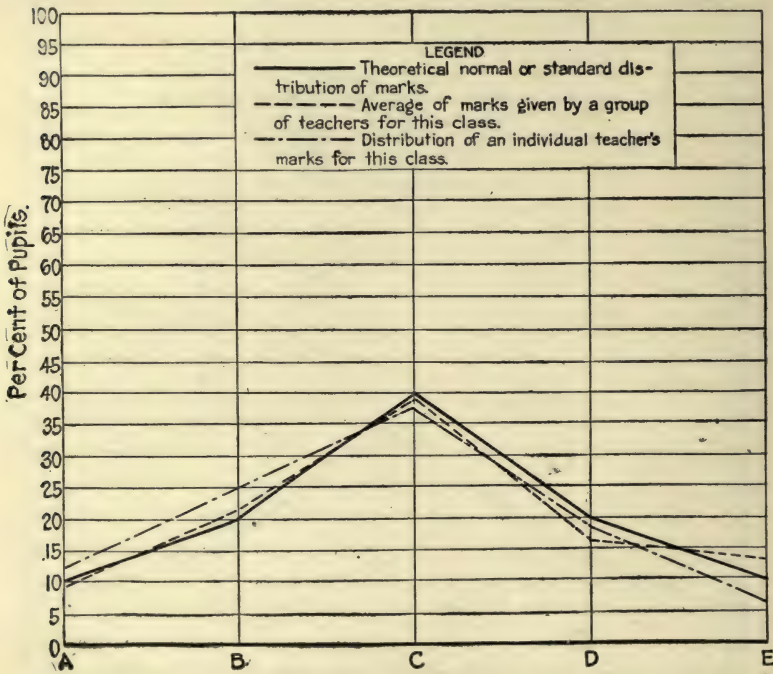

Figure 67. (c) Graphic Representation of Teacher's Ratings—Normal Assignment of Grades

the one who gives the ratings to question himself seriously on the following points:

1. Have I distributed my marks judiciously, or have I unconsciously tended to give too many marks of a certain grade?

2. Am I marking too strictly or too leniently?

3. Have I for some reason a selected group, i.e., are they especially good or especially poor?

4. *Avoiding "Averaged Opinion."* A statistical error

common to many rating schemes is involved in the "averaged-opinion" plan. According to this method, each of several observers records his judgment of an individual on each of several characteristics, denoting the rating in per cent or by assigning a numerical value. The final rating is then secured by totaling and averaging all of the ratings given by the dif-

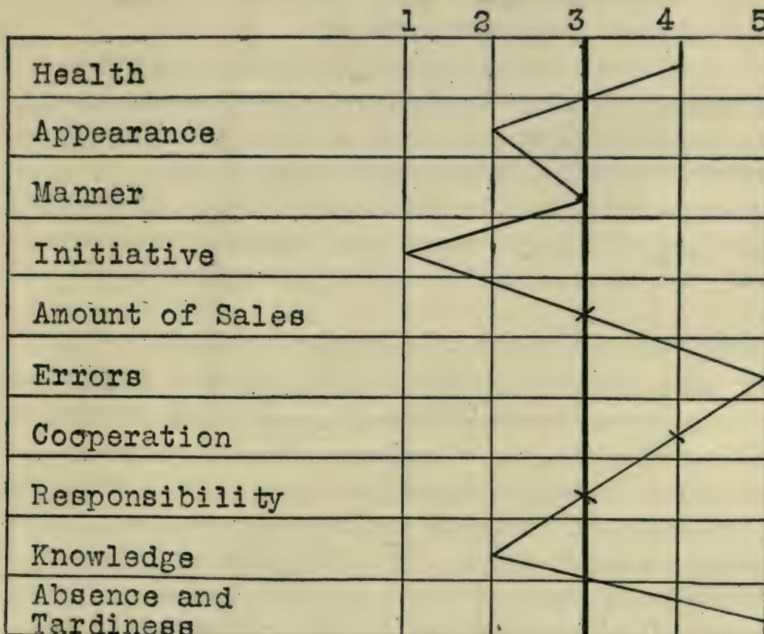

Figure 68. An Individual Rating Chart

ferent observers. This average may be farther from the truth than the statement of any one observer. Multiplying the number of characteristics upon which the rating is given merely increases the probability of error.

5. *One-Man Estimate.* It is much safer to have some superior officer study the ratings of the observers, noting the marks given on each characteristic, and making a final estimate

in the light of his knowledge of the general conditions and the personalities of the observers. Real vocational guidance, either in the school or in the shop, depends upon the collection of evidence from several sources, followed by a sympathetic analysis which can take many conflicting factors into account. Figure 68 suggests a graphic method of recording the rating which lends itself well to a study of this kind. Five is the highest grade given, one the lowest.

In the main, it is much better to ask for specific, concrete statements regarding the employee's ability and progress than to ask for numerical or letter grades. Since specific estimates cannot always be secured in writing, those who have transfers and promotions in charge can always profit by frequent opportunities for conferences regarding individual cases with supervisors, inspectors, and department heads.

Importance of Uniform and Objective Standards

Some form of objective efficiency rating is a vital part of the program for training and for supervised occupational adjustments. Progress or achievement records for employees, like the majority of teachers' marks, are based largely upon opinion and fail to reveal to the person rated the specific failings or good qualities. A rating given on general characteristics or expressed in general terms is open to serious errors. In place of such marks we ought to have objective standards for measuring a child's actual accomplishment in school, or an employee's daily performance and his value to the firm. The examples cited show that a good basis for improved rating methods already exists. Employment managers and directors of industrial education who attempt to install record systems will do well to review the literature on teachers' marks. An educational campaign among those who give ratings should bring them into agreement upon terms and standards and help them to distribute their marks justly.

CHAPTER XVII

THE EDUCATIONAL VALUE OF DEMOCRATIC PARTICIPATION IN MANAGEMENT

The Democratic Shop

Because of the general tendencies of the time in state and national government, it is only natural that co-operative management plans should multiply among industrial establishments. The demand for a modification of the old autocratic control of the shop was by no means created by the war. It was to be expected, however, that fresh interest in this field would arise as the result of our participation in a struggle which more clearly defined our democratic ideals. Even if there were nothing else to favor the democratic shop than its proved efficacy in promoting industrial harmony, we could justly anticipate for it a remarkably rapid development. Reinforced as it is by other valuable contributions to efficiency in production, and with a vitally significant background of public opinion, it is not too much to say that the questions involved in the democratic control of industry deserve to be classed among our most important national issues.

Management Problems

The leading causes which have brought about the necessity for a change in methods arose from the complication of management problems as our industries increased in size. Management and men have become more widely separated and are less and less able to understand each other. Every thoughtful worker is able to detect evidences of inefficiency on the part of his superiors, and because he knows little or nothing of the

real difficulties involved in executive control, he is outspoken and frequently bitter in his denunciation of the policies of the firm. Similarly, employers are too far removed from the workman to appreciate the harassing conditions under which he labors or to get at the root of the multitude of small troubles which so frequently lead to grave consequences.

Utilizing Labor's Knowledge

One of the chief weaknesses of many large concerns is the inability or unwillingness of the leaders to tap the immense reservoir of knowledge and ability possessed by the rank and file of the organization. The proponents of scientific management have found this their greatest obstacle to progress. To insure the success of their plans, information must be gathered at the start from experienced, thoughtful employees, and even after standards of practice have been formulated, their successful introduction and efficient modification depend upon the sympathetic understanding of the operatives.

Value of Incentives

Another weakness of the large industrial enterprise with its minutely subdivided and highly specialized occupations lies in the difficulty of finding incentives sufficiently strong to hold the interest and secure the active co-operation of employees. If employees derive any real satisfaction from their work, it usually comes in large part from sources outside of the immediate task, yet bearing vital relationship to it. Thus the opportunity for self-expression afforded by the exercise of some power of control over the materials and processes used and over the physical conditions of the work-place may add greatly to the worker's satisfaction in his accomplishment and at the same time open the way for the utilization of an extremely powerful incentive. Furthermore, a voice in management adds much to the creative imagination which the work-

man can bring to his bench; it changes him from an unthinking, often unwilling cog in the machine into a planning, directive force.

Three Types of Plan

Several measures, all looking toward the objectives outlined above, have already been considered in connection with the functions of the employment manager and the control of formal educational activities. It is the purpose of this chapter to present several democratic types of management in such a way as to appraise their value as sources of satisfactory incentives, as well as to reveal their possible contributions to the informal education of the working force.

The plans now in use in the United States may be roughly divided into three classes:

1. The collective bargaining agreement with trade union committees.
2. The plant association of employees.
3. Shop committees.

The Collective Bargaining Plan in the United States

The collective bargaining plan is exemplified by the New York cloak and suit industries. Some six years ago democratic principles were introduced in these shops by bringing together two groups: the manufacturers who had been gathered into a single manufacturing association, and the employees in their combined trade organizations. A board of control, composed of representatives of these two groups and representatives of the public, was elected, which for nearly six years successfully maintained industrial peace while passing upon a great variety of important suggestions and grievances brought before it by 3,000 employers and 75,000 employees. Under the protocol drafted by Mr. Brandeis, now Justice Brandeis of

the United States Supreme Court, all trivial or purely personal troubles were adjusted by local shop committees, only matters of common interest or grave importance being appealed to the general trade board of arbitration.

Somewhat similar arrangements have been entered into by Hart, Shaffner, and Marx and other clothing firms of Chicago, and by the Colorado Fuel and Iron Company. In both cases the employers deal directly with union representatives in deciding upon labor policies, in handling grievances, and in improving working conditions.

Collective Bargaining in England

In England, this plan has been widely adopted in the form of "shop stewards'" or "trade union" committees. These committees are composed of workers only, elected by the trade union members in the works to represent their interests before the management.

C. G. Renold of Hans Renold Limited, Manchester, writes as follows in the *Survey*, October 5, 1918, regarding the functions which these committees may discharge:

> It is doubtful whether a shop stewards' committee can, or should, cover the full range of workers' activities, except in the very simplest type of works. The mere fact that, as a purely trade union organization, it will deal primarily with wages and piecework questions, will tend to introduce an atmosphere of bargaining, which would make the discussion of more general questions very difficult. Further, such a committee would be likely to consider very little else than the interests of the trade union, or of themselves as trade unionists. While this is no doubt quite legitimate as regards such questions as wages, the more general questions of workshop amenities should be considered from the point of view of the works as a community in which the workers have common interests with the management in finding and maintaining the best conditions possible. Moreover, in many shops where workers of widely differing grades and trades

are employed, a shop stewards' committee is not likely to represent truly the whole of the workers, but only the better organized sections.

Plant Associations of Employees

The second type of management may be illustrated by the labor democracy established by the Standard Oil Company of New Jersey. Early in 1918 the company announced an election by secret ballot for representatives from seven divisions of the Eagle Works who were to hold a joint meeting with representatives of the company, with the intention of establishing a working plan governing labor relationships. For the purpose of the election, the several departments of the plant were grouped in seven divisions, each electing two delegates. The fourteen representatives of the employees who were thus chosen assisted in formulating plans which have been gradually modified until they include the following features.

Joint conferences of employees' representatives and company representatives are held at each of the works at least quarterly to discuss matters of mutual interest. A general conference of all the employees' representatives from the various works and company representatives is held annually at the call of the president. Company representatives at these joint conferences never exceed the number of the employees' representatives. These meetings consider wage adjustments, promotions, discipline, discharges, suspensions, and other matters affecting the employees.

Through these meetings, agreements have been reached, in drawing up a list of offenses for which an employee may be suspended or dismissed without further notice. For other offenses not on this list, an employee cannot be discharged without first having been notified that the repetition of the act will render him liable to dismissal. The foreman sends a copy

of this notification to the employment department which may, after investigation in case of a second infraction of the rules, either approve a proposed suspension or arrange to transfer the employee; or, if the facts warrant, a discharge may take place with the approval of the superintendent of the works.

Any employee who believes that he has been unjustly treated or subjected to any unfair conditions, first seeks to have the matter adjusted by conference in person, or through his regular elected representative, with the foreman or employment department. He also has the right of appeal to the general superintendent and higher officials of the company. This relieves the employee of the necessity of going to the foreman if he does not care to do so, since his elected representative can always act for him.

Other provisions of the joint agreement relate to the establishment of an employment department in each plant under a manager directly responsible to the superintendent of the works, a plan for annuities, sick benefits, and life insurance, certain sanitary improvements, and new housing projects.

Employee Representation—Philadelphia Traction Company

The co-operative scheme of the Philadelphia Rapid Transit Company offers another illustration of a similar plan. This arrangement was perfected in August, 1911, following a period of bad management which left the company bankrupt and without the confidence of either its employees or the public. As perfected after seven years of trial, during which the public has had a continuity of service as against the strike conditions previously prevailing, a large amount of new rolling stock has been added to the company property, wages have been materially advanced, greater advantages in sick and death benefits to employees have been assured, and the number of accidents cut in half. The plan now has the following features:

The entire group of employees is divided into classes, or

departments, and each department is again subdivided into compact groups or branches. Differences arising between employee and employer may be settled by any one of the following representative groups:

1. Branch committees
2. Department committees
3. General committees
4. Board of arbitration

Membership in these bodies is in no way limited by membership in any union or any other organization. "To qualify as a voter the employee must have been six months in the company's service, must be regularly assigned to duty, and not occupying an official position of any character with the company. . . . A candidate to be eligible to election as a committee member must be regularly assigned to duty and have been continuously in the employ of the company for not less than two years."

Whenever resort to arbitration becomes necessary, one arbitrator is chosen by the general committee of employees and another by the committee representing the management. The two thus chosen select a third. If they fail to agree upon a third person, the Provost of the University of Pennsylvania, the Chairman of the Public Service Commission, or the Chairman of the Chamber of Commerce may be selected to serve as additional arbitrators or appoint their own personal representatives.

The co-operative plan is supported by dues of $1 per month. Membership is voluntary and is open to all employees who have been one year or over in the service and who are more than 16 years of age. In addition, the company gives $10,000 per month toward the support of the activities of the Co-operative Welfare Association which include life insurance, sick benefits, and pensions.

The "National Government" Plan

An interesting modification of the usual employees' association has been adopted by the Printz-Biederman Company of Cleveland. In its inception, democratic management in this company was carried on through the house of representatives composed of employees, the senate which included the foremen and department heads, and the cabinet, or executive group made up of company officials. In the course of time, it was found that there was no need of a double check on the action of the employees such as the senate of foremen provided. Moreover, the senate tended to reduce the opportunity for direct contact with the management. For these reasons, the double legislative form was abolished and the foremen have come to be regarded as a training body which co-operates in various ways with the other two groups.

The Sidney Blumenthal Company of Shelton, Connecticut, has also followed the suggestion from the organization of our national government in inaugurating participation in management. There is a house of representatives elected by the employees from the different departments, one representative being provided for at least thirty employees. The foremen and overseers constitute the senate, which meets separately. The local officials of the company comprise the executive group, or cabinet. Proposals are drawn up in the shape of bills which are taken up for discussion independently by each of the two houses. In case of a failure to agree on the necessity or the wisdom of any bill, it may be placed before the cabinet for consideration. No matter can be decided, however, by the cabinet alone. It must appear before the two houses to explain its stand on any proposition and either persuade the members of the houses to change their minds or be persuaded itself as to the propriety of indorsing a bill.[1]

[1] This form of shop control has been described in detail by John Leitch in his volume "Man to Man."

Shop Committees

The third plan for participation in management has wide variations, but in the main it may be described as a simple committee arrangement established by the management for specified purposes. Safety, sanitation, the employees' benefit association, the management of a cafeteria, the suggestion system, gardening, or recreation may call for the election or appointment of a committee to co-operate with the management in planning new policies or in attending to the details of control. Thus a metal finishing company in New York, as the result of an unexpected strike in 1916, called a meeting of the representatives of the employees which succeeded in adjusting a dispute after a three days' discussion. It was found that a considerable number of petty grievances constituted the main cause for dissatisfaction. As a result, a shop grievance committee was inaugurated which consisted of representatives elected by the employees of each department. These representatives, in turn, elected a second committee of five to meet weekly with two representatives of the management for discussing and adjusting complaints or grievances.

Fore River Shipbuilding Plant

The Fore River Shipbuilding Plant of the Bethlehem Steel Corporation has for several years maintained a committee organization which is under the management of a special board. Its several committees have charge of an employees' benefit association, a co-operative store, suggestions, the fire department, safety, and a considerable number of affairs which come under the head of the service department, such as the works' paper, first aid, grievances, restaurant, band, and athletics. During the early part of 1919, the Bethlehem Steel Corporation announced two new plans of committee representation, one for its shipyards and the other for the steel-mills.

Welfare Activities

The shop committee affords an excellent opportunity for the education of employees in a principle of management which is now coming to be widely adopted with reference to so-called "welfare" activities. The cafeteria, the dental clinic, athletics, housing projects, and medical aid are among the numerous benefits which have been stigmatized because they were occasionally maintained by unscrupulous employers as a palliative for low wages, long hours, and bad working conditions. When they are viewed as opportunities for exercising the collective buying power of the group, and administered on a cost basis, the employee contributing his fair share to their maintenance, the stigma is immediately removed. Such benefits are always more fully enjoyed and more economically managed when the needs and wishes of the employees are closely consulted and when the employees have some direct part in their organization and control.

Importance of Mutual Confidence

All of the plans outlined above are but mere mechanisms, wholly worthless for the accomplishment of their intended purposes, unless both the management and the employees approach the innovation with mutual confidence and with several essential governing principles clearly in mind. Professor Hoxie voiced one of these considerations in his discussion of the attitude of organized labor toward scientific management. Reviewing disagreements and personal grievances which arose out of the application of scientific management principles in shops which he investigated, Professor Hoxie arrived at the following conclusions:

> Even where the manager was open-minded and thoroughly democratic in sentiment, it sometimes turned out that he could not understand the viewpoint of the workers or had no idea of the intricate workings of the system as it affected

them, and so failed to remedy existing evils. The writer has in mind one of the best shops where the management is thoroughly fair and liberal in spirit, in which conditions existed which would not be tolerated for a moment by a body of workers with a real voice in affairs, or by the management if it knew of them, yet the front office here is always open. The fact is that where workers are individualized as in scientific management shops, their just complaints will not ordinarily be voiced even to a management in which they have confidence, much less to an autocratic employer. Anyone who knows anything of working class psychology understands perfectly well that the individual worker does not dare to unburden himself to his superiors even under the best of circumstances. He fears to get himself marked down as a kicker or an agitator.

Sympathetic Management

Exactly the same difficulty arises with respect to the employees' association or the shop committee unless the workmen are brought to feel that they have a real chance to voice grievances before someone who will act fairly and immediately, and who will take an interest in carrying out the practical details of the adjustments which are agreed upon. No matter how good the plan for democratizing the shop may be, it is sure to fail if it is placed in the hands of a superintendent who does not want it, or who does not believe in it. The working plans must be carefully drawn and the task of organizing and directing this complicated and delicate machinery is time consuming and demands exceptional qualities of leadership. It is not likely to be done well unless there is an employment manager or some other official exercising equal authority who can devote himself to it.

Definite Plan of Procedure

Furthermore, since this machinery is especially designed to bring to light the causes for grievances or deadlocks before

they become acute, it is desirable that meetings be held frequently and regularly. By forming the habit of conferring on a variety of problems where no great interests are at stake and no serious tension exists, it becomes easier to settle major differences when they do arise. Having a regular time of meeting does away with the tendency on the part of either side to make out a good case at all costs and to indulge in faultfinding and abusive language rather than a careful consideration of just claims, a tendency which is quite sure to appear when expectations have been aroused by the announcement of a special conference. Full provision must be made for elections and meetings which must be held largely during working hours, and which will consume much time, either on the pay of the company or the association.

It is desirable, finally, to have every grade of worker represented, a condition which it is of course difficult to meet in many plants where a single department may contain five or six grades of workers, women as well as men, and members of several different unions.

The Trade Union and the Democratic Shop

In July, 1917, a working class organization was instituted in French war factories by virtue of a circular issued by M. Albert Thomas, then Minister of Armaments. All establishments having more than 50 operatives were urged to provide for the election of delegates who would serve as a link between the work people and their employers, so that the latter might be kept informed of all matters pertaining to the welfare of their employees.

Aside from a proviso as to length of service with the firm, all workers over 18 years of age, enjoying civic rights and of French nationality, were declared eligible as delegates. Although no limitation was set upon the election of representatives, the great Paris newspaper, *Le Temps,* inferred in its

discussion of the movement that close co-operation was being maintained with the Federation of Metals, and went so far as to assert that "a vast working class organization, which it is frankly intended to connect with the *Confédération Général du Travail,* is thus being introduced into France." There is here apparent a fear that recognition of the demands of organized labor are being forced upon industry as a war measure, not by legislative action, but by the simple expedient of issuing a circular from a minister's office.

There seems to be no reason to suppose that the movement for participation in management in the United States is likely to follow any such course as that feared by *Le Temps* in France in 1917. At present the idea, in so far as it is separated from the efforts of organized labor, is regarded with slight favor both by autocratic managers of open shops and by the majority of labor leaders.

Advantages of Shop Organization

On the whole, it is probably fair to the movement to say this: Experience seems to indicate that there are a group of local problems peculiar to the individual shop in which the trade union has no immediate interest, but which can be effectively handled by the shop committee or the employees' association. One of the weaknesses of the majority of unions affiliated with the American Federation of Labor is that they represent only a part, often a minority, of the people in a given factory. Office employees, executives, helpers, apprentices, and persons in many unskilled trades have no representation and no means of getting a hearing regarding their just complaints about local matters. Moreover, the union suffers by continually losing its most competent leadership as its best men are promoted to be foremen or to other executive positions where they are not eligible to union membership. The independent shop organization overcomes some of these dis-

advantages, but it should not be regarded as necessarily excluding trade union membership. One of the chief disadvantages of the shop committee or "American" plan is that no pressure can be brought upon the backward employer who gives no more consideration to his shop committee than he did to his employees as individuals. There ought to be no objection to the extension of the democratic shop plan so long as it is safeguarded by absolute freedom in the choice of representatives, full liberty in the judicious exercise of the representative privilege, separate meetings attended only by employees, and the right of union membership.

Advantages of Co-operative Activities

1. *Inspiring Employee.* As an educational factor, the employees' association or the shop committee has several significant values. The failure of suggestion systems in certain plants has been due in part to two reasons: first, the lack of directed thought concerning matters about which suggestions were needed; and, second, the opportunity for leisure to work out new plans. The organization of a shop committee, or an employees' association, makes it necessary for the company to lay out specific pieces of work for the employees to attempt. Rightly directed, the democratic shop implies systematic consideration of important topics, continuous training of employees in methods of management, and, what is perhaps more significant than the others, time set aside in which the workman meets with others to consider problems of common interest.

Several companies have recognized the great educational value of committee representation by providing that the representatives from any shop or department shall be changed at frequent intervals and that no one person may hold the office of representative for a greater time than one year. The work of a safety committee is an excellent case in point.

It is not infrequent to find a close relation between the number of accidents in a plant and the length of service, a large proportion of injuries occurring among new employees. Unless there is some efficient plan of formal instruction for new employees, it is nearly impossible to improve this situation save by gradually creating a body of workmen who through service on committees come to recognize the importance of safety propaganda and voluntarily help in warning and instructing newcomers.

2. *Removing Discontent.* One of the chief benefits to be expected from the operation of a co-operative plan is a reduction in the causes for discontent. This may take place in part because of necessary adjustments made as the result of suggestions and conferences, but not a little of it may be attributed to a better understanding on the part of employees of the problems faced by the management. Through an educational program based on this principle and extending over a period of years a contribution may be expected to the improvement of working conditions and shop procedure.

3. *Raising Esprit de Corps.* Even with democratic organization carried to the extreme, there remains the demand on the part of employees, possibly unconscious or dimly defined, for leadership in which they can feel complete confidence. There is a natural response on the part of intelligent workmen to efficient planning, to an atmosphere of purposeful, well-directed activity, in which there is opportunity for the productive exercise of individual skill or talent. From this point of view the democratic shop raises problems not unlike those presented by self-government in the school or college. Under a management which already has the confidence and support of the student body or the shop personnel, almost any plan can be worked, but no scheme can be expected to cure bad discipline caused by lax control exercised by inefficient leaders. Under good leadership, opening the door to a

share in management is likely to increase confidence and improve esprit de corps through a better understanding of the difficulties of control, by promoting group consciousness and loyalty, and by broadening the workman's concept of his part in the undertaking as a whole.

4. *Stimulating Industrial Training.* The wide-spread adoption of democratic management plans cannot fail to intensify the need for industrial training and general education. So long as workers are dealt with like soldiers in an army, who must give unquestioned obedience to orders, the intelligence of wage-earners and their knowledge of fundamental company policies are of secondary importance. Under the new regime, where employees have a share in responsibility and a voice in administrative councils, education becomes the keystone of the arch. Ignorance and immaturity of thought are dangerous at any time; their disastrous effect will appear more clearly when management and men are brought into closer contact.

Future Participation in Management

Many indications point to a gradual extension of a share in management to employees. Some firms are granting democratic shop control merely because they fear the radical labor movements. Others have appreciated the latent educational and social possibilities in employee representation and are shaping their plans to make use of the hitherto submerged interests and abilities of the working force. If shop committees or other forms of management sharing are to succeed, education has a grave responsibility to face in making workers ready for the change.

CHAPTER XVIII

A FACTORY SURVEY TO ESTABLISH TRAINING

Preliminary Investigation

When a training department is to be established in a factory, several lines of investigation need to be pursued before any classes are definitely organized. In the majority of concerns, training is fully established only by degrees; the work must prove its value and is extended only as the need for it can be demonstrated. It is therefore important to make sure that the groups first selected for training not only need instruction but are likely to undertake it willingly. The basis for instruction must be found in the methods in use in the plant, and something more is needed for this purpose than the experience of the skilled employee who is to do the teaching. Standards, both of method and content, must be drawn up for each instruction unit. All of the agencies, both within and without the factory, which can be utilized to advantage in organizing or maintaining the work ought to be discovered.

Organizing Plant Knowledge

Every industrial plant, large or small, presents a serious problem when one attempts to organize and utilize the mass of available pertinent knowledge regarding it. Executives and workmen alike possess invaluable information which must by some means be reduced to systematic form before it can be effectively transmitted to others. Trade and technical literature, even advertising material, is often rich in content, but useless for teaching purposes until it is organized or rewritten. Where scientific management has made any headway, standard

practice books and instructions to executives represent an extremely rich source of data. In one New England establishment the writer found the following series of printed booklets and typewritten documents:

1. Syllabus for an instruction course for planning department apprentices.
2. Syllabus of instruction for foremen and department instructors.
3. Instructions for stenographers.
4. Plant department check list of subjects for instruction of minor executives.
5. Instruction or standard practice book for employment department executives.
6. Instruction or standard practice book for foremen and superintendents.
7. Manual for planning department executives and time study experts.
8. Standard practice book for planning clerks.
9. Book of forms and instructions for their use. (Employment department.)
10. Instructions to watchmen.
11. Book of information and instruction for employees.

Because this material had never been systematized and cross-indexed for the use of the educational department, much of its value had never been realized. There was naturally a considerable duplication of subject matter in the several documents, and at times confusion as to policies because new standard practice sheets for one book were not always inserted in others to which they had reference.

Task of Educational Director

In beginning his work, the first task of an educational director is to determine the groups for which training is to

be offered, the second is to collect and put in teachable form the facts and principles to be taught, and the third to organize practical problems and suitable opportunities for developing mechanical skill. The nature of the group to be taught determines the relative emphasis to be placed upon general or technical knowledge and upon mechanical skill or dexterity.

Operations Classified

Five varieties of conditions under which work is carried on may be distinguished in the majority of industries. All of them ought to be in the mind of the investigator who makes a survey for establishing training. The classification disregards, of course, operations which are performed infrequently or for which it is uneconomical to expend money in investigation or in teaching standard practice; it includes only important, frequently repeated operations.[1]

1. Group operations performed by a gang or a group such as assembly work or the heavy punching done on steel plates in the shipyards. Many of the operations performed by girls in candy factories are of this character. The new employee simply works with the group and quickly absorbs information regarding the entire process. Formal training is unnecessary but the inspector or assistant foreman should take an interest in seeing that the beginner advances as rapidly as possible.

2. Skilled operations requiring a high degree of technical knowledge and skill, such as tool-making, where there is little or no repetition work, or pattern-making. Training on such tasks is a long process and can only be accomplished effectively through an apprentice school, a trade school, or by means of continuation or part-time classes.

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[1] "Training Employees for Better Production," Training Bulletin No. 4, Training and Dilution Service, United States Department of Labor, page 20.

3. Automatic operations which are almost entirely automatic, either because the machine is automatic in operation or because the machine is set up fully prepared for each piece of work by a job-setter or a mechanical expert. Press-feeding, lasting, or edge-trimming in a shoe factory, and the majority of mechanical factory positions are of this type. Training may be given on the production floor, either on machines set aside for the purpose or in a bay separated from the regular flow of production. Where the number and variety of machines and operations is large, it may not be possible to train for each position in a vestibule school, but the saving in time and the improvement in the morale of the working force may make it advisable to have at least a part of the operations taught in a separate room or building. From the beginning this work is almost entirely of a productive character.

4. One-way operations such as oxyacetylene or electrical cutting and welding, chemical processes, or riveting, chipping, and calking, where the difficulty depends upon the handling of refractory materials or hand-tools, or a knowledge of simple routine processes which must be performed in an exact order and under carefully standardized conditions. Such operations always need a special room or bay and individual instruction with some preliminary practice on scrap material, allowing the student to proceed as rapidly as possible to productive tasks.

5. Repetitive bench operations involving repetition but not done as gang or teamwork. Many operations in the printing, paper-box making, and rubber industries are of this character. In most cases it is highly desirable to have the operative trained in a separate room or bay but it may be accomplished by inspectors or instructors in charge of small groups in factory rooms. Training should be on production from the beginning of the training period.

Survey of the Factory

With these standards in mind, the investigator is ready to undertake a study of the factory. The outline which follows suggests the several steps in the order in which they would naturally be undertaken in making a preliminary survey of a manufacturing plant where nothing had previously been done to establish formal methods of training employees.

I. Comprehensive Study of all the Financial, Executive, and Production Departments

1. Concise statement of the duties of each executive, showing the limits of his authority and his relations to other executives. Obtained from standard practice book if one has been prepared.
2. Tabulate the occupations in each department and indicate the number of persons engaged in each occupation.
3. Compile statistics giving the length of service of present employees, showing the distribution for the company as a whole and then by departments and important occupations.
4. Study the seasonal fluctuations of the number employed in each department for a period of at least three or four years. Plot the changes in the number employed as suggested in Figure 10, page 24.
5. Study the labor turnover figures by departments and by occupations for the same number of years.
6. Make a brief preliminary examination of the amount of experience and technical education required for the occupational groups represented in each department. This will be supplied in sufficient detail by job specifications or the data upon which the standardization of occupations and wages has been based. (See pages 225 and 254.)
7. Analyze the principal sources of labor supply for each occupational group.

II. Detailed Analysis of Departments Shown to Need Training as a Result of the Study Outlined under (1) Above

1. Detailed study of the nature and number of positions represented in each department, showing the number of persons employed, their length of service, previous experience, education, and nationality.

2. Detailed study of each task to bring to light the mental and physical requirements, the length of time necessary to learn the work, and the tools, machines, processes, and methods utilized.
3. If skill or technical knowledge or both are required in a position, determine whether there are satisfactory opportunities for acquiring these elements in connection with routine employment.
4. Determine upon a relatively small number of occupations for which training ought to be undertaken first. The choice will depend largely upon the relative importance of the positions to the company and the need for training evidenced by labor turnover and the available sources of trained workmen.

III. Analysis for Training Purposes of the Occupations Selected[2]

1. Study location and number of machines, benches, tools, and other equipment, and connection of each job to other closely related work.
2. List all operations or processes in order, determining the relative difficulty of each.
3. Rearrange work processes in the order in which they should be taught.
4. Study methods of inspection, cost studies on wastage of sundries, time and motion studies, and any other available data which will furnish supplementary instructional material.
5. Determine whether training should be given in the shop or in a separate room.
6. Schedule instruction for persons already employed so that it may come at hours when the production load is least.

IV. Study Training Opportunities Outside of the Plant Which May Supplement the Efforts of the Training Department

Sources of Information

At this point the investigator should be able to make use of data collected by public education authorities. Several

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[2] For an excellent discussion of the subject, see "The Instructor, The Man, and the Job," by Charles R. Allen (Chapters V to XIV).

cities have made excellent beginnings in surveying the local industries to determine the nature of the vocational instruction which should be offered by or in co-operation with the public schools. Indianapolis, Indiana, Richmond, Virginia, Cleveland, Ohio, and Wilmington, Delaware, are among the cities for which published studies of this kind are accessible. None of the studies so far undertaken, however, have had the cooperation of a sufficient number of industries in which studies of the kind outlined above could be carried out. The trade analyses of these surveys, as well as the data regarding the exact needs of individual industries, are therefore deficient.

In drawing up instruction plans, much ingenuity needs to be exercised to make sure that all of the existing sources of information are tapped. A check list ought to be prepared at the start showing all the records kept by the company, the previous investigations made and on file, and the departments and persons having especially useful information. Such a list of sources for information concerning the instruction of newly employed operatives might include:

1. Job specifications: special difficulties and exactions of each position.
2. Trade tests: fund of general information regarding operations; get original data, if possible.
3. Time and motion studies: review cases in shops with planning agents; revise to bring out instruction point in each step of operation or process.
4. Departmental instructors: discuss difficulties of learners and order of present instruction.
5. Inspectors: outline mistakes which need to be guarded against by instruction.
6. Foremen: general information regarding operations, and instruction points; list of examples of failures due to lack of instruction.
7. Safety engineer and compensation department: safety

points of individual machines or jobs; review past cases to draw out possible prevention through education.

8. Medical department: Causes of accidents and infections; illustrative cases for teaching use.
9. Cost accounting: Waste due to carelessness or lack of instruction; give particular attention to waste of sundries.

Theory of Wages

In making the survey, one should never lose sight of the essential economic facts upon which the labor contract is based. Several different factors enter into the determination of the amount of wages that are paid to an employee. The first element is the amount of time which he devotes to the employer's service. Without considering productive accomplishment, the first important element in determining the wage is the total number of hours of employment. In the second place, payment is made for the expenditure of physical energy. Work which requires little skill or intelligence is usually poorly paid, but wages tend to increase gradually as the amount of physical energy expended increases. A third element is manual skill or dexterity, the amount of the wage being dependent upon the time required to reach a certain level of production and the relative difficulty of mastering the details of the task. Willingness to receive orders or instructions, and the ability to interpret and execute them with dispatch and accuracy constitute a fourth factor. To a limited extent among operatives, but to a much larger degree among executives, salesmen, or clerical employees, payment is given for an intimate knowledge of manufacturing details, company policies, and other practical information relative to the immediate task which is gained almost solely by experience and observation. Finally, the employee may be paid for the application of his experience

and his knowledge of mathematical, scientific, or technical principles to the solution of practical problems.

Training and Wages

Fundamentally, then, training ought to be designed to increase the worker's earning power, or what amounts to the same thing, his productive value to the concern. Especially when educational work is first being introduced, experience has shown that it is wise to draw a clear line of distinction between the training functions and the general educational functions outlined in Chapter VIII, page 130. Otherwise it is not easy to keep the accounts of the training department free from charges for activities which have only indirect effects upon production, the direct value of the work is obscured, and it is difficult to "sell" it either to employees or to the management.

A Training Program

The accompanying chart (Figure 69) suggests a method for outlining courses of study after the groups of students to be taught and the nature of the work to be given to each group have been decided upon. Instruction for both office and operating departments has been divided into four divisions.

1. The employee will need to have a certain amount of practical experience in the work of the office or shop. This may be secured in the vestibule school or by doing productive work in the executive or manufacturing departments.

2. His working experience may be supplemented by inspection trips, in the course of which he learns something of the geography of the plant, the routine flow of work, and the relations which exist among the several divisions of the organization. He may profitably spend considerable time observing workmen or executives who are engaged in tasks related to his own.

3. Each employee will need to have at least a small fund of information regarding the company's history, its organization, policies, and methods. For those engaged in clerical or executive duties this division will need to be enlarged upon much more than in the case of machine operatives.

4. For unskilled or semiskilled workmen it is likely that no related academic or technical instruction will be planned. The amount of stress to be laid upon this section of the program will depend in large part upon the desire to prepare the student for future advancement or to enable him to hold a more responsible position in management or production.

Groups	Experience								Inspection Trips and Observation							Knowledge of Company's History, Organization, Policies, and Methods						Related Academic and Technical Instruction					
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	6	1	2	3	4	5	6
A..........	x	x	..	..	..	..	..	..	x	..	..	..	..	..	..	x	x	..	..	..	..	..	..	..	..	..	..
B..........	..	..	x	x	..	..	..	..	x	..	..	..	..	..	..	x	x	..	..	..	..	x	..	..	..	..	..
C..........	..	..	..	..	..	x	..	..	x	x	x	..	..	..	..	x	x	x	..	..	..	..	..	..	x	..	..
D..........	..	..	..	..	x	..	x	x	x	..	..	x	..	..	x	x	x	x	x	x	..	..	..	..	x	x	..
E..........	x	..	x	x	..	x	x	..	x	x	..	..	x	x	x	x	x	x	x	x	x	..	..	x	x	..	x

Figure 69. Chart of the Training Program

Chart of Training Program

Each of the numbers heading the vertical columns in the chart represents a small instruction unit. After the illustrative material for any unit has been collected, arranged in proper teaching order, and the instructor's notes and check lists have been typewritten, the whole is bound in a loose-leaf folder.

Suppose that *A* in the chart represents a group of semiskilled machine operatives; *B*, another group of operatives on a higher grade of work; *C*, a group of clerical employees; *D*, a group of minor executives; and *E*, college or technical school graduates who are preparing themselves for executive positions. The units of instruction to be taken by each group

are represented by the crosses in the columns across the chart. The number and character of the units to be studied and the method to be pursued in giving the instruction will depend upon the character of the particular group of employees under consideration.

Common Subjects

In a high school or college there are certain subjects which many students take regardless of the particular course being pursued. Elementary mathematics, civics, and physical training are familiar illustrations. Similarly, there will be certain units of instruction which will be planned for nearly all employees. The first two groups of columns on the chart will contain the best examples of such units.

Naturally, specialization in the plant is much greater than in the school, but it will help in organizing the instruction plan to recognize similar elements in different specialized training courses and adjust the teaching schedule accordingly.

Placing the Employee

When a new employee is hired or a former employee is enrolled for training, the first step is to analyze his previous experience and education in the light of the work for which he is to be trained. The next step is to select from the available instruction units those which particularly suit his needs. The final step is to assign him to the groups receiving instruction in these subjects in such a way that he will be associated with persons as nearly as possible of the same grade of intelligence, skill, education, and experience.

Provision for Foreigners and the Unskilled

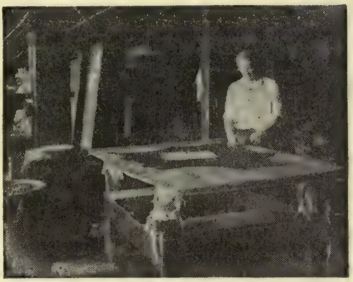
The treatment in this and previous chapters shows the need for preliminary research upon which to base courses for advanced students. It remains to point out that instruction

SHEEPSKIN TANNING

ENGLISH LESSONS IN LEATHER MAKING.

COLOR CELLAR AND TACKING LOFT

LESSON 21



TACKING SHEEPSKINS

FAN USED IN DRYING ROOM

PUTTING OUT AND TACKING

1. makes	Coloring skins makes them wet and wrinkled.
2. must make	We must make the skins smooth.
3. call	We call this putting out.
4. is	What is putting out? (See Lesson 19.)
5. must keep	We must keep the skins smooth.
6. tack	The tackers tack the skins on boards.
7. dry	The skins dry on the tacking boards.
8. take	The strippers take the skins from the boards.
9. hurt	Sometimes tackers hurt their hands.
10. should go	They should go to the doctor.
11. may get	They may get blood-poisoning from the skins.
12. use	Some tanneries use fans in drying skins.
13. must not put	I must not put my hands into the fan.

Figure 70. Sample English Lessons for Foreigners

Prepared by Charles H. Paull and George F. Quinby. Copyright by the Associated Industries of Massachusetts.

for foreigners and unskilled laborers requires quite as thorough preparation of materials drawn from specific industrial experience. The work done by the Associated Industries of Massachusetts with the co-operation of the Harvard Bureau of Vocational Guidance in preparing lessons in English for Americanization classes is a relevant example.

These studies provide the pupil with text material drawn from the terms used in the factory in which he is employed. The lessons include elementary instruction in safety, sanitation, and company policies, all based upon the peculiar needs of the industry in question. A sample lesson developed for a concern manufacturing leather products is shown in Figure 70. The teacher is also furnished with a manual which describes the work of the factory in greater detail, thus enabling her to supplement the text. Work of this character enables the school to hold men and women who could not be interested in subjects less closely connected with the daily routine, and paves the way for more general subjects.

It is certainly desirable for the state to assist in making studies of this nature, as well as to train teachers and supervisors.

CHAPTER XIX

A NEW EMPHASIS IN EDUCATION

Underlying Principles

It will be evident from the survey offered by the foregoing chapters that it is impossible to set forth specific plans of procedure for industrial education which are capable of application throughout the United States. On the other hand, experience has proved that there are certain underlying principles which ought to govern good practice.

The intention in the preceding discussion has been to emphasize the practical work which can be and should be accomplished in the factory or by co-operation with public or private schools. Before attempting to summarize and evaluate these activities, it is important to consider certain fundamental points of view with reference to vocational education.

Educational Aims

A few of our educational leaders have long maintained that one of the chief purposes of the schools and colleges is to make opportunity for the unusual man or woman, the person of genius, to cultivate talents that can be utilized in socially helpful ways. Certain of our college and university presidents have emphasized the point of view that their institutions exist primarily for the purpose of training for leadership, and that they have no part in the general improvement of the mediocre classes. This attitude, coupled with the stress laid upon research in purely academic fields, and upon scholarly attainments to the exclusion of practical knowledge and vocational training, except in a few professional fields, has resulted

in sending from the higher institutions into the secondary schools a group of instructors and administrators dominated by the same aims. Such an educational program is neither safe in a democracy nor is it economically sound.

The modern menace of Bolshevism has given point to the advice offered by George Washington in his farewell address:

> Promote, then, as an object of primary importance, institutions for the general diffusion of knowledge. In proportion as the structure of a government gives force to public opinion, it is essential that public opinion be enlightened.

It is no less important that the thousands of employees in the ranks of industry should be taught something of the simple elements of economics, the historic origin of present conditions, the principles of scientific method, and the fundamentals of good government. than that university students should do research work in libraries and laboratories. Our industries are in urgent need of numerous second-level officers—foremen, assistant foremen, inspectors, and minor executives—who are constantly on the firing line, ready to lead and to instruct, fully prepared to block the work of malicious and ignorant trouble-makers.

Popular Knowledge and Progress

Industrial progress is no longer dependent upon the achievement of a few scholars and leaders. The complexity and diversity of present-day conditions are such that little advancement is possible without first raising large numbers of persons to the place where they are ready to welcome improvements. Many of the owners and executives and the majority of the foremen and operatives in our industries are persons of limited technical training. Only a small proportion have had high school or college preparation and millions of

both workers and leaders have only the meager equipment of the first five or six grades of the elementary school. This fact explains in large part why scientific principles in mill construction, improvements in housing and transportation, and industrial hygiene and sanitation make relatively little progress except in a few large, well-advertised concerns. It lies at the root of the waste of materials, inefficient working methods, and petty injustices common to factories and workshops everywhere. Labor leaders are given to obstructive tactics and executives tolerate abuses and negligence mainly because the men of neither group have been educated to the point of appreciating the possibility of better management.

Our Problem—Dr. John H. Gray

Dr. John H. Gray, in an address before the California Teachers' Association at Santa Monica, summarized our national problem of industrial education as follows:

> The lower classes must increase their earning capacity and intelligence. They must be made to share in a much larger measure than at present in the inheritance of the race, and in the control and direction of industry. They must be able also to earn and obtain a larger share of the material goods and of educational opportunities. They must come into part of the leisure and of the opportunities for real culture which consists of the acquiring and enjoying the products of the progress of the centuries. I shall not weary you with the oft-published proof from many sources that the children in the dispossessed classes . . . cannot possibly get more than the mere rudiments of reading, writing, and numbers. . . . What these children get now does not materially increase their earning power or efficiency or their happiness. But it does enable them to accumulate dissatisfaction and to communicate more readily their misery, their anger and their hatred to others. In other words, it enables them to make trouble.

Our Problem—Lester F. Ward

Lester F. Ward, in his "Applied Sociology," has stated the same argument in these terms:

> There can be no equality and no justice, not to speak of equity, so long as society is composed of members, equally endowed by nature, a few of whom only possess the social heritage of truth and ideas resulting from the laborious investigations and profound meditations of all past ages, while the great mass are shut out from all the light that human achievement has shed upon the world. The equalization of opportunity means the equalization of intelligence, and not until this is attained is there any virtue or any hope in schemes for the equalization of the material resources of society.

Three Questions

To approach the matter from a slightly different angle, let us ask three questions:

1. From the worker's standpoint what are the essential conditions to contentment and satisfaction in employment?

2. Is the capacity for leadership and successful attainment widely distributed?

3. Cannot unusual capacity be expected to assert itself without supplying special assistance or incentives?

Equality Among Men

Ward builds his whole philosophy of education upon the proposition that from the point of view of applied sociology all men are really equal.

> Nor is this in the Jeffersonian sense precisely, though it is in a sense akin to that, viz., that whatever may be the differences in their faculties, all men have an equal right to the exercise and enjoyment of the faculties they have. Applied sociology is "egalitarian" to the extent of aiming to secure this right for all men equally.

Viewed from this angle, inequality and unhappiness arise because of the lack of education and because of faulty occupational adjustments.

> The real misery of the world is due to the partial deprivation of the power of men to exercise the faculties with which nature has endowed them. On the other hand, whatever degree of happiness men enjoy is due to the power to exercise their faculties and to no other source. The problem therefore manifestly is how to secure to the members of society the maximum power of exercising their natural faculties. It is a purely subjective problem and has nothing to do with the relative superiority or inferiority of men. It is wholly independent of the question of their intelligence or ability or social value. It is even independent of their capacity to enjoy or to suffer. It matters not how much satisfaction they are capable of deriving from the exercise of their faculties; it aims only to enable them to enjoy such faculties as they may happen to have.

Conclusions of Investigators

Exactly the same conclusions have been reached by a group of investigators such as Carleton Parker, Ordway Tead, and George E. Johnson who have studied the fundamental human instincts as they are evidenced in the lives of the working classes. Satisfaction in employment, enjoyment of one's work, comes because the environment and the occupation itself give rise to natural, pleasure-giving feelings and actions. Discontent, worry, fatigue, arise because the instinctive mental and physical responses of the worker are repressed or forced into wrong channels. "It is now all too plain," says Tead, "that the undercurrents of industrial unrest and discontent which come to the surface with increasing frequency have had their source in an unconscious but tremendously effective repression of human aspiration and desire. The release of energy and vigor, which is needed to clear the air, will not come until we see human nature as it is."

Taussig's Conclusion

Approaching the same question from the economic side, workmen, like society at large, are distributed not according to individual endowments but rather according to the chances of environment and heredity. Movements from grade to grade in the social scale are not free. And this lack of freedom is largely due to inequalities in education. The following paragraph from Taussig's "Principles of Economics" indicates the dangers inhering in such a situation.

> Freedom in the choice of occupations is one of the most important conditions of happiness, and the traditional position of common labor is due to the absence of such freedom. The disparities in earnings and in social position of which this is the most glaring are not consistent with the ideals that are dominating the civilized world. They are most of all inconsistent with the aspirations of democracy. It is probable that, even with the removal of all artificial barriers to free movement, common labor would still remain, as its present name implies, the most common and least paid. But such great discrepancies as the world has hitherto accepted as a matter of course are not inevitable. They bring grave social dangers, in the intensification of class prejudices and class struggles. They bring a false attitude in the rest of the community toward all manual labor—an unworthy contempt for indispensable work. An elevation of this group to a plane of higher pay and better social regard would indeed mean that other groups would be relatively worse off—they would no longer secure the fruits of hard labor on cheap terms; but it would mean a better distribution of happiness.

Distribution of Capacity

The second of the three questions proposed above must be answered before such a redistribution can be brought about. It relates to the number and position in life of persons who are capable of a real achievement—achievement being defined as a contribution to social or economic progress made by any

intelligent person who utilizes his knowledge or skill in science, art, letters, or practical affairs for the good of the social group. Taussig, although admitting that the problem is unsolved, and that the experimental method cannot be applied to it, expresses the conviction that every evidence shows the commanding influence of opportunity and environment as contrasted with the effect of heredity:

> Anyone of intellectual capacity who consorts with the average persons of the "superior" classes, and observes their narrowness, their dulness, their fatuous self-content, their essential vulgarity, must hesitate before believing that they and their descendants achieve success solely because of unusual gifts. Their favored position must be due, in large measure at least, to training, advantageous start, fostering environment. If few from among the lower classes rise, it must be because of the repression of many who are talented. Only those of very unusual vigor and ability can escape from the trammels. A great fund of capacity, no less in its possibilities, remains undeveloped. Though variations between individuals are unmistakable, variations between classes are declared to be unproved. . . . Those of the very highest gifts are doubtless least dependent on adventitious aid. Generals probably are born, not made. But colonels and captains can be trained. In the ranks there may be many men who have it in them to become good officers, yet are kept in the ranks because no way is available for bringing out the sterling qualities which they possess.

Opportunity and Success

Ward, pursuing the investigation of the presence of persons of genius in all classes and attempting to disprove the theory that successful men are in large part self-made, quotes at length from the work of Alfred Odin, "Genèse des Grands Hommes," Paris, 1895. M. Odin studied the physical, religious, and educational environment of some 5,260 authors who lived in the French portions of Switzerland, Belgium,

and Alsace Lorraine from 1300 to 1825. He shows that with almost no exceptions these men had stimulating educational and environmental opportunities of one kind or another, and that practically none of them may be said to have forced their way through sheer personal ability into a place of prominence. Ward likewise reviews the cases by which Galton and others have sought to prove that many of the world's foremost scientists, mathematicians, artists, and other persons of genius made their way in spite of limited resources, poverty, and unfortunate heredity. He successfully demonstrates in every case that those presenting this argument either did not know "certain vital facts" or that they "purposely suppressed them."

A typical example is the case of D'Alembert, whom Galton described as a foundling brought up in the home of a poor glazier, who attained in spite of apparently hopeless circumstances to the first rank of celebrity at the age of 24. Ward shows that D'Alembert received 1,200 pounds annually from his father, that he received an excellent education for his time, and that he suffered but little from the stigma of illegitimacy, since public opinion in France at the time was thoroughly tolerant of persons of uncertain parentage.

Self-Made Men

Of the few men of talent who passed their youth in poverty or economic insecurity, all are found upon closer examination to have had some fair substitute for means and education, such as the assistance of ecclesiastical authorities, the acquaintance and support of other men of prominence, or special encouragements or financial subventions. To quote again from Ward:

> In every case, had such aids been wanting we should never have heard of the men in question. . . . It is entirely safe to say that in every case of an alleged self-made man,

> could his entire history be told, or the particular part of it that explains how he succeeded in escaping the repressing influence of adversity, it would be clear that something besides his own genius came in to turn the scale in his favor. As Odin says: "We always see some fortuitous circumstance enabling them to receive an education far superior to that which they could have obtained in view of the economic condition of their parents."

Repressed Capacity

These are only suggestions of the array of facts and opinions which Ward assembles on the negative side of our third question. The records of every vocational guidance bureau in the land, the experience of every teacher or school principal who has striven to promote the success of his pupils in later life, all give a like answer. Under our present industrial system, unusual capacity, when evidenced among the laboring classes, is almost universally repressed and undeveloped. The occasional brilliant exception merely illustrates the law of blind chance; it by no means proves that genius is bound to assert itself regardless of environment, training, or incentives.

Developing Opportunities

Here, then, are fundamentals which should underlie all forms of industrial education. Of primary interest is the wide-spread dissemination of general educational opportunities through continuation schools, part-time schools, and the extension of the compulsory age limit. We must make it impossible for radical and ignorant persons to continue their hold upon the working classes. Better vocational guidance and improved methods of personnel management which will eliminate the unhappiness of those in misfit occupations and release workers from the fear of unemployment and unjust discharge, better adaptation of working conditions to

the physical and mental constitution of the employee, are all matters of public as well as private concern. We ought to assist persons of ability who appear among families in straitened circumstances to acquire the elements of a general education and to take their first steps in becoming economically independent. If the vestibule school, the apprentice school, or the trade school enables the poor boy or girl to make "the start in life," the part-time school, the free state-supported high school and college, and a variety of educational opportunities maintained at public expense or by private corporations should open the way for continued advancement toward a more noteworthy achievement.

Education at Public Expense

Education at public expense can no longer be maintained upon the theory that it is designed to help only the exceptional man. It must further the advancement of every class and it must utilize all its resources in discovering and promoting men and women who make the less spectacular but vitally necessary minor contributions to progress. None of the colleges and but few of our high schools have done this hitherto —the tendency of their courses has been to create an aristocracy of moderate means instead of democratic opportunity for the development of useful talents.

A Lesson from Agriculture

Professor John H. Gray has pointed out in his public addresses that we may well take a lesson of hope from the history of our state universities and land grant colleges. When they found that their agricultural courses were educating people away from agriculture and thereby impoverishing the nation's sources of supply, and that few of their students ever went back to the farms, these colleges gave up their traditional aims and established an education for the farmers

of a lower grade than college rank. "From that day to this, those schools have been the most growing and popular of all our educational institutions and have actually been educating farmers, the great majority of the students going back to farm life."

Educational Reorganization

To accomplish a like far-reaching benefit for industry requires that industrial education be given through agencies which are continually transforming and being transformed by going concerns. It has been true of most educational institutions that their teaching in both form and content has lagged behind social progress. A vitalized training program must in some way eliminate this fault. John Dewey in his "Democracy and Education" has stated the matter with reference to general education in these terms:

> Educational reorganization cannot be accomplished by merely trying to give a technical preparation for industries and professions as they now operate, much less by merely reproducing existing industrial conditions in the school. The problem is not that of making the schools an adjunct to manufacture and commerce, but of utilizing the factors of industry to make school life more active, more full of immediate meaning, more connected with out-of-school experience. The problem is not easy of solution. There is a standing danger that education will perpetuate the older traditions for a select few, and effect its adjustment to the newer economic conditions more or less on the basis of acquiescence in the untransformed, unrationalized, and unsocialized phases of our defective industrial régime. Put in concrete terms, there is danger that vocational education will be interpreted in theory and practice as trade education, as a means of securing technical efficiency in specialized future pursuits.
>
> Education would then become an instrument of perpetuating unchanged the existing industrial order of society,

instead of operating as a means of its transformation. . . .

Any scheme for vocational education which takes its point of departure from the industrial régime that now exists, is likely to assume and to perpetuate its divisions and weaknesses, and thus to become an instrument in accomplishing the feudal dogma of social predestination. Those who are in a position to make their wishes good, will demand a liberal, a cultural occupation, and one which fits for directive power the youth in whom they are directly interested. To split the system, and give to others, less fortunately situated, an education conceived mainly as specific trade preparation, is to treat the schools as an agency for transferring the older division of labor and leisure, culture and service, mind and body, directed and directive class, into a society nominally democratic.

Consulting Industrial Leaders

On the other hand, if we tolerate a form of education disassociated from the influence of progressive industrial leaders, a situation is bound to develop which is no less dangerous than that against which Professor Dewey has warned us. Educators are too prone to see the defects in the "existing industrial order" and hold aloof from it rather than attempt to improve it in practical ways. The only hope for either the factory or the school is to open the channels of communication and admit the possibility and the need for mutual transformation.

Part-Time Instruction

In the specific field of the work to be accomplished for industry by the colleges and technical institutions, one of the transforming agencies is part-time instruction. Employment managers, directors of industrial education, industrial physicians, safety and sanitary engineers, housing experts, and the executives in production, sales, and planning departments must be persons of some maturity with a background of practical

experience. Applied training in preparation for such positions cannot be given in connection with the regular college program for either undergraduate or graduate students. General courses which deal with principles and current problems can be offered, but they must be supplemented later on by advanced part-time training or short-unit courses. Even if the younger, inexperienced student had the apperceptive basis for the assimilation of training, progress in methods of administration would force him in a few years after graduation to seek the assistance of agencies for instruction and research.

In administering part-time and continuation courses, the first aim should be to render service to those engaged in a particular kind of work, regardless of preconceived entrance requirements. If necessary, academic standards can be safeguarded by offering certificates or degrees of a different grade. For the present, the function of government departments and educational institutions is to set attainable minimum qualifications for enrolment. In due course of time, industrial concerns will themselves raise the standards for the persons whom they employ.

Contact with Industry

A necessary corollary of part-time education is enlarged opportunity for instructors to come into more intimate contact with industry. Consultant work is not always a desirable means of gaining practical experience because if well done it exacts too much of the instructor's time and energy. Furthermore, work of this character can be accomplished to better advantage by well established bureaus or organizations with more facilities than the average professor can command. An excellent suggestion is afforded by the plan adopted in 1911 by the East Pittsburgh Works of the Westinghouse Electric and Manufacturing Company. Each year a five weeks' course of study is offered to engineering instructors

in groups of from 14 to 30 members. They work in the plant and hold meetings under the supervision of the company's educational director to discuss methods of teaching and listen to lectures on engineering subjects.

Proposed Plans

A report presented in 1918 by the Committee on Technical Training of the National Association of Corporation Schools describes some of the ways in which industries are co-operating with technical schools of college grade. The plans enumerated by the committee include the following:

1. Conferences between professors and manufacturing experts or executives for the purpose of improving courses of study and working out problems and thesis subjects.
2. Lectures by representatives of industrial concerns before classes or meetings of instructors.
3. Arrangements by which professors may be aided in collecting data upon which to base classroom lectures or problems.
4. Inspection trips or observational visits.
5. Employment of students and instructors during vacations or on a part-time basis.
6. Co-operative efforts to place graduates to better advantage.
7. Provisions for supplying schools with demonstration equipment, models of machinery, and exhibits of products and materials in process of manufacture.

Very little has yet been accomplished by the industries in assisting schools of secondary or lower grade. Something has been done through inspection trips and lectures, but in most cases no technique has been evolved which guards against a variety of obvious disadvantages. The motion picture films,

lantern slides, exhibits, and printed material prepared by a few firms are suggestive of what might be attempted, but they have failed thus far to be of much educational value because the advertising element has been too prominent in them.

CHAPTER XX

FIXING RESPONSIBILITY FOR THE NEW PROGRAM

Responsibility of Government

The ultimate responsibility of the state to provide vocational as well as general education has been fully recognized by recent legislation and by executive decisions. National aid for vocational education is an accepted fact and seems likely to be greatly extended in scope and amount. The functions of the state are to set up minimum administrative requirements, to train and certify teachers, and to equalize local differences in willingness and ability to give suitable training by spreading the burden of taxation over a larger area. The sphere of national authority and control ought to consist in determining desirable and attainable goals and in equalizing opportunities and resources. Both state and national control are advantageous so long as they combine provisions for necessary uniformity with sufficient active encouragement and latitude to enable the local community or individual factory to meet its peculiar needs and preserve a proper initiative.[1]

Responsibility of Industry

The economic disadvantages of throwing the whole responsibility for training on the shoulders of manufacturers was stated more than a decade ago by Alfred Marshall in his "Principles of Economics." After referring to the small number

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[1] For a discussion of the principle of state responsibility for education and of the advantages and disadvantages of state control in general education, the majority of which apply here, see Cubberly's "Public School Administration," Chapters I-III.

of employers who are willing to appropriate funds for the education of employees, he continues:

> And even they cannot always afford to carry the investment of capital in the training of their men as far as they would have done, if the results of the investment accrued to them in the same way as the results of any improvements they might make in their machinery. Even they are sometimes checked by the reflection that they are in a similar position to that of a farmer who, with an uncertain tenure and no security of compensation for his improvements, is sinking capital in raising the value of his landlord's property.
>
> Again, in paying his workpeople high wages and in caring for their happiness and culture, the liberal employer confers benefits which do not end with his own generation. For the children of his workpeople share in them, and grow up stronger in body and in character than otherwise they would have done. The price which he has paid for labor will have borne the expenses of production of an increased supply of high industrial faculties in the next generation; but these faculties will be the property of others, who will have the right to hire them out for the best price they will fetch; neither he nor even his heirs can reckon on reaping much material reward for this part of the good he has done.

Drawing the Line

Education in technical and general vocational subjects for younger pupils is already well supported. The moot questions in financial support and executive control of industrial training center about specific occupational preparation, and training on a part-time basis for promotion. In the majority of cases it appears to be wise to divide the financial responsibility. Schools or classes for younger students, such as continuation schools, general industrial schools, part-time schools, or evening classes, where the training is sufficiently broad in scope to enable the worker to utilize it in several different lines, should be free to the pupil and supported entirely at state or federal expense. For older students or

for training useful to only one concern, the burden should be divided between the public and the individual firm, the proportion to be contributed by the firm varying according to the character of the instruction. For classes for advanced students, such as minor executives, employment managers, or foremen, a fee may well be paid by the student, the amount in some cases to be refunded by the firm after a certain period of service.

Possible Resources

The possibilities of special forms of taxation are suggested by the fact that our manufacturing industries in 1914 represented a capital investment of $22,790,980,000. The year's pay-roll was $5,367,249,000. A half of one per cent of the amount paid in wages would have placed a fund of $26,836,000 at the disposal of the management in these firms to use for training employees, employment management, or health, sanitation, and housing projects. Many firms spent several times this percentage, but because of the lack of concerted action and public support, their efforts were largely wasted.

The Small Firm

For thousands of small firms, very little training is necessary and, because of the small numbers employed in any given occupation in a restricted locality, formal instruction under public supervision is impracticable. What is urgently needed is a realization on the part of such employers of the possibility of improving their methods of supervision and inspection, and of induction of new employees. This can only be accomplished effectively by concerted action and by a pooling of resources under a system of government assistance which provides money subvention and expert advice based upon research.

The British Experiment

The British government has undertaken an experiment which may serve as an appropriate model. It has set aside a fund of a million pounds sterling to be used by an industrial research department. The appropriation is to be expended on a co-operative basis in the form of contributions to special associations of manufacturers to be established for research purposes. Each co-operating firm is assessed an amount to be determined by the size of the plant, and enjoys the following privileges:

1. It will have the right to put technical questions and to have them answered as fully as possible within the scope of the research organization and its allied associations.

2. It will have the right to recommend specific subjects for research, and if the committee or board of the research organization of that industry consider the recommendation of sufficient general interest and importance, the research will be carried out without further cost to the firm making the recommendation, and the results will be available to all the firms in the organization.

3. It will have the right to the use of any patents or secret processes resulting from all researches undertaken, either without payment for licenses, or at only nominal payment as compared with firms outside the organization.

4. It will have the right to ask for a specific piece of research to be undertaken for its sole benefit at cost price, and, if the governing committee or board approve, the research will be undertaken.

"Unit" versus "Dual" Control

Discussion of the administrative control of vocational education has created two strongly opposing factions. One group maintains that the existing school authorities are not interested in specific training and that their experience unfits

them for dealing with factory matters. They contend that schoolmen have disregarded the advice of advisory boards composed of manufacturers and business men and have been unwilling to employ capable staff experts to organize and supervise vocational classes. The more radical members of this group recommend a system of separate boards and administrative officers as the only means of gaining headway against academic traditions.

The opposing attitude was well stated by Dr. Charles A. Prosser in an address which he delivered in New York City in 1914.

> Whatever may be our individual opinions with regard to the proposal that the states and local communities establish separate and independent systems of schools for vocational education, every indication seems to show that the American people are not ready for this step and that they want first to give the regular school system a chance to deal with the task. The American people do not want, if it can be avoided, two different systems of education in the same community competing for the same children; competing for the same funds out of the same public treasury. . . .
>
> Whatever may be the situation elsewhere, a dual system of vocational education for New York City is unthinkable. Everybody recognizes that the magnitude and complexity of the task make it impossible under the conditions which obtain in New York City to handle the matter in any other way than under the regular Board of Education. The schools of New York City are going to be called upon to deal with this subject of vocational education. If they fail, if they make that education academic instead of practical, if they fail to serve the interests of those who ought to be prepared for their work in life, if they do not secure and use this information that the practical man has to contribute, if a distinctive management is not established which will enable these schools to grow up and realize their aim unhampered by traditions, then we shall have a demand for an independent system for vocational education.

In other sections of this address, Dr. Prosser shows that there are strong arguments in favor of independent authorization, but that all of these can and should be attained through a plan of "distinctive management" operating under the regular board of education. This means granting a larger field of responsibility and more initiative to persons selected because of their fitness for conducting vocational schools.

Unit Control

The leading arguments in favor of ultimate unit control of all education are:

1. It insures continuity of purpose in planning and directing all activities.

2. It eliminates duplication of effort and overlapping responsibilities.

3. Financial support can be more evenly distributed and taxes are more equitably adjusted.

4. Flexibility in adjusting the program to fit individual or local needs is not possible where two occasionally opposing and conflicting agencies occupy the field.

Dual Control

Reduced to fundamentals, the arguments favoring divided or dual control center about personalities. The fear is expressed that men are not to be found who can grasp the need for all forms of education, or who will see that each receives its due share of support.

Wisconsin is the only state having a separate organization for directing vocational education. There is a State Board for Industrial Education with control over state-aided vocational schools, and in each community the regular board of education appoints two employers and two skilled employees who, with the city superintendent, are held responsible for the management of industrial schools. It is significant that

the strongest advocates of this system have taken care to explain that in practice it is "not a separate but a delegated control, being itself controlled through appointment by the larger body, the general board." [2]

Vocational Education in Massachusetts

State-aided vocational education in Massachusetts dates its beginning from 1906 when the Commission on Industrial and Technical Education appointed by Governor William L. Douglas reported to the general court. As a result of recommendations based on a survey of industrial conditions and the work then being done in the schools of the commonwealth, legislation was enacted which placed the administration of state-aided vocational education in the hands of a commission on industrial education. For three years extremely valuable pioneer work was done, not alone for Massachusetts, but for the entire country, since but little trade or industrial training was then being attempted anywhere in the United States. In 1909 the work of the commission was merged with that of the state board of education. A deputy commissioner for vocational education with a staff of assistants was given charge of the work and the chairman of the industrial commission became a member of the state board of education. The abandonment of the commission plan was brought about largely because its activities could not be satisfactorily articulated with those of other state agencies. Under the new plan, excellent progress has been made with none of the friction and duplication of effort which characterized the dual system.[3] Under certain conditions it is possible that preliminary research or the organization of schools may profitably be undertaken

[2] H. E. Miles in Report of Committee on Industrial Education at the Twentieth Annual Convention of the National Association of Manufacturers, New York, 1915, page 27 ff.

[3] For a résumé of ten years' progress, the reader may consult Bulletin of the Massachusetts Board of Education, 1917, No. 6, "State-Aided Vocational Education in Massachusetts."

by independent commissions or boards, but routine administration appears to be most effectively accomplished under a central authority reponsible for all the educational activities subject to state supervision.

Vocational Education in California

California may be given as an example of several states which manage their vocational schools and classes through a commissioner of vocational education appointed by and responsible to the state board of education. No special body has been created to administer state work under the Smith-Hughes Act, the state board of education having been empowered to expend both state and federal funds for vocational education.

Smith-Hughes Plan

The salient feature of the national situation in its bearing upon dual control is that funds have been appropriated for a limited number of purposes. Under the Smith-Hughes and preceding acts, financial aid and supervision are possible only for teaching agriculture, home economics, and trade and industrial subjects. Commercial education and general education have been entirely disregarded. This will lead to similar distinctions in the states, since they appropriate amounts equal to those given by the Federal Board for Vocational Education and for like purposes. The national government through this legislation takes the stand of encouraging certain kinds of education to the exclusion of others which are equally vital to industry as well as to the public welfare. The Smith-Hughes plan, whatever its deficiencies, has made one outstanding contribution toward solving our educational problem; it has given representation to agriculture, industry, and labor in educational direction. This is a suggestion which state legislation ought to follow.

Putting the Program Into Effect

In the survey presented in this volume the discussions have centered about a number of well-defined phases of the subject under consideration. Each chapter gives rise to a variety of conclusions, all of which must be viewed together in order to obtain a correct perspective of industrial training as a national problem. In the remaining part of this chapter will be summarized the results of our survey in so far as they reveal suggestions for future action. Some of the steps immediately to be taken will be briefly outlined.

Desirable Governmental Action

State and national responsibility for vocational as well as general education should be recognized through legislation which will appropriate funds for:

1. Centralized administrative boards and executive officers.
2. The training of teachers.
3. The distribution of aid for local schools and classes in proportion to the average number of persons in attendance, the character of the work attempted, and the amount of local public expenditure.

Minimum standards should be agreed upon by state and federal officers and enforced by state authorities for the training and certification of teachers, school equipment, courses of study, and school attendance.

The training of employment managers and of teachers for industrial classes should be regarded as a governmental function of utmost importance. For the time being the work should be done mainly on a part-time basis or in short-unit courses. To secure the maximum results, great care should be exercised in selecting candidates for training.

In order that a matter of so great importance as public

education should receive the consideration which it deserves, national authority ought to be vested in a member of the president's cabinet with such divisions or bureaus in his department as are required to administer federal aid for the states, conduct surveys, engage in research, and publish reports.

Fostering Community Enterprise

Local initiative should be safeguarded and encouraged by allowing considerable latitude on all matters of general policy and by leaving the administration of details entirely in the hands of local boards. Financial aid from the state combined with minimum requirements have been found extremely powerful incentives to a higher standard of accomplishment.

Comprehensive community and plant surveys should form the basis of all attempts at training either in the factory or in the school. As managed at the present time, vocational education often fails to give the kind of instruction required for the development of efficient workers, and neglects entirely numerous important occupations. Public agencies have no right to refuse training for any legitimate occupation which includes enough persons desiring training to make up a class of reasonable size. Surveys ought to be planned to show the existing local needs and to collect data for teaching purposes.

Enlarging Place of Public Schools

The place of the public high school in training industrial workers should be greatly enlarged. On the one hand, the secondary school can extend upward to include practical courses for adults in shopwork, mechanical drawing, factory management, mathematics, economics, and science. It can open its doors to community forums, Americanization classes, trade extension courses, or meetings of employees. In the

smaller communities, the school library ought to be extremely helpful to executives and operatives alike.

On the other hand, the high school ought to be the center for continuation and part-time education. The boy or girl employed for the first time ought to turn naturally to the school as a source of inspiration and assistance. This means adding to the teaching staff men and women of large practical experience, many of them employed in the local industries on a part-time basis.

Utilizing the secondary school for industrial as well as other vocational demands will be more effectively achieved through the cosmopolitan or general high school than by establishing high schools of special type. It is true that it may not always be practicable to put such work in the general high school because of local traditions and the attitude of school officers and the teaching force. Nevertheless, the general high school is an established institution with large capital in the way of prestige and popular support as well as more tangible assets, such as buildings and equipment, administrative staffs and teaching forces. It can be enabled, by adaptation and expansion, to meet the most diverse needs of the modern community.

Continuation education, not less than six hours each week, should be provided for those under eighteen years of age. There should be a minimum requirement of civics, physical culture, English, and history. Beyond this, the work should be determined solely by the occupational and social needs of the student.

In order to increase the school's opportunity, the compulsory school age should be increased under national legislation to fifteen years, with provision for a child's withdrawal at fourteen when his work is essential to the family support, or when he is a public charge, or when further school attendance is obviously unprofitable.

Industry's Share of the Burden

Industry should share with the public the expense of technical and trade education as well as the burden of conducting research in all employment problems. The determining principle for distributing the load should be the nature of the instruction or research undertaken. Where the work has general public value, apart from its worth to the concern, the proportion of state aid should be larger.

Associations of manufacturers, as well as other private agencies capable of doing research or participating in the training of teachers or employees, should be utilized wherever possible and should receive direct assistance and guidance from state and federal sources. Duplication of agencies is wasteful and productive of constant disagreement. It may be avoided by means of close co-operation between public and private agencies.

Every industrial enterprise employing 500 or more persons should have the services of an educational director whose functions will be of the nature of those outlined in the chart on page 130. Smaller concerns should have the assistance of state, county, and municipal officers and the co-operation of the local schools.

Helping Industry Help Itself

Industrial training, as well as many other forms of personnel work, can be accomplished for the majority of small concerns only by the establishment of research and service institutions of a new type. Bureaus associated with universities, or maintained by states, cities, or private commercial organizations, can maintain staff services for companies too small to employ shop instructors, interviewers, employment managers, industrial physicians, and other personnel workers.

Such bureaus can also exert a large influence in eliminating obsolete methods of preparing the employee for his task.

Apprenticeship, for example, is unsuited to most industrial pursuits. Vestibule training and short-unit courses are the natural substitutes.

Where apprenticeship persists, it ought to be under state supervision and part-time instruction should be given in related technical subjects. The period of apprenticeship, moreover, should be shortened in view of adequate previous experience or exceptional ability.

The development of methods for training foremen is greatly needed in many concerns. The field is being exploited by so-called "management experts" who cannot or will not do the careful preliminary research upon which good instruction depends. Every assistance should be rendered industry, to the end that this very important factor in all enterprises—the work of the foremen—shall receive the attention to which it is entitled.

In justice to employees of all grades and for the good of industry, objective efficiency rating-scales should supplant the opinion of foremen or supervisors as the basis for wage increases, advancement, or discharge. Too long has the biased judgment of foremen or supervisors determined the fate of those under them. No opportunity should be lost to impress upon industry the value of intelligent treatment of the rank and file of the industrial army.

Fitting Workers for a "Larger Life"

Except for a minor number of occupations, industrial training cannot be regarded as preparation for a lifework in the sense that a normal school prepares a teacher or a technical school trains a chemist. For many occupations, indeed, not much of that sort of preparation is needed. The majority of factory operatives need only a short period of preliminary instruction, varying from a few hours to several months. Beyond this, however, workers of this sort should have oppor-

tunity for general self-improvement, for retraining in case of transfers, and for preparation for promotion.

The most serious industrial problems arise among the unskilled and semiskilled classes. For them, industrial education ought to mean lessons in English, campaigns for better housing, education in thrift, home-making, hygiene, and sanitation, assistance in gardening, or in arts and crafts, better forms of recreation, physical training, stimulation of capable persons to seek the training necessary for advancement, and acquaintance with the elementary economic principles of the industrial world so that they may understand their environment.

Among these classes, private enterprise has done little beyond what the most urgent necessities have required. It is true that working and living conditions have been slightly improved, English classes have been provided for foreigners and illiterates, and participation in the benefits of sick, accident, and death insurance has been encouraged. If, however, some form of democratic participation in management is to be a feature of industrial enterprise in the future, much more must be done. The employee must be made ready for the change through education. And for the accomplishment of this task, the school and industry should share responsibility.

APPENDIX A

EDUCATIONAL SURVEYS OF TECHNICAL SECONDARY SCHOOLS AND CLASSES

As a rule, the school surveys have devoted comparatively little attention to secondary education. Several of them contain no specific references to technical schools or classes. Even the so-called "vocational" surveys have been largely concerned with trade schools, continuation and evening classes, apprenticeship, part-time instruction, and other similar phases of training. Such references as do appear are significant in so far as they are conclusions reached after a thorough examination of the whole educational situation in a given locality.

Since the material is widely scattered through the several surveys and is at times somewhat difficult to interpret, it has been considered worth while to collect it in this form for the use of readers who are interested in vocational education. The selections were chosen with a view to an adequate treatment of the question of the appropriate aims and work of technical high schools, and with the thought of suggesting proper methods of approaching the problem of their administration, rather than with the intention of presenting an exhaustive digest of the statements made by the several surveys.

Survey of Cleveland, Ohio[1]

The report offers a number of significant comments on the work of the high schools. "The two technical high schools, the East Technical and West Technical, occupy an important place among the secondary schools of the city. At the present time the two schools enroll nearly two-fifths of the boys attending high school. The course comprises four years' work. In the East Technical the workshop includes joinery and wood-turning during the first year, and pattern-making and foundry-work during the second year. In the West Technical the first-year course includes pattern-making and either forging or sheet metal work; and that of the second year,

[1] Lutz, R. R., "Wage-Earning and Education," The Survey Committee of the Cleveland Foundation.

forging, pipe-fitting, brazing, riveting, and cabinet-making. During the remaining two years of the course the student may elect a particular trade, devoting about 10 hours a week to practice in the shop during the last half of the third year, and from 11 to 15 hours during the fourth year." The remainder of the student's time is devoted to the usual academic subjects.

The state law in Ohio places the limit of the compulsory attendance period for boys at 15 and for girls at 16. One of the results has been to force into the high schools a large number of pupils who plan to leave as soon as they reach the end of the compulsory period. Since a large proportion of the boys in this group naturally prefer some form of education which seems to promise immediate practical benefits, many of them elect the technical courses. "About 25 per cent of each entering class drops out after attending one year, and 25 per cent of the remainder by the end of the second year. By the time the third year is reached the classes are greatly depleted and the survivors are as a rule of the more intelligent and prosperous type. Only a small proportion of them expect to enter skilled manual occupations."

The following table is based on the replies to questionnaires sent to all graduates of the East Technical High School up to 1915. Although the numbers involved are not large, they show that the tendency of the school is in the direction of preparation for civil, mechanical, and electrical engineers.

Distribution by Occupation of Cleveland Technical High School Graduates[2]

Occupation	Number	Per Cent
Attending college	111	39.2
Draftsmen	51	18.0
Electricians	33	11.6
Machinists	32	11.2
Chemists	8	2.7
Pattern-makers	7	2.4
Cabinet-makers	6	2.0
Printers	3	1.5
Foundrymen	1	0.3
Unclassified	32	11.2
Total	284	100.0

[2] Lutz, R. R., "Wage-Earning and Education," The Survey Committee of the Cleveland Foundation. Table 10.

Data furnished by these graduates as to their earnings during successive years after leaving school indicate that they tend to leave the manual or handwork occupations after two or three years. Less than 2 per cent of the graduates of these schools are working in the building trades as artisans. Other statistics presented by the report show that the occupations represented by the shop courses offered in the technical high schools are not relatively important among the city's industries.

The conclusions and recommendations of the survey with respect to these high schools may be summarized thus:

1. The technical high schools seem to be training most efficiently for:

(a) Higher institutions
(b) Supervisory and executive industrial positions
(c) Drafting and office work in manufacturing plants
(d) Industrial chemistry

2. Students attending only one or two years would derive greater benefit from more practical courses.

3. Special reports were made by the Cleveland Survey on the following occupational fields: commercial work, department stores, garment trades, dressmaking and millinery, metal trades, building trades, railroad and street transportation, printing trades. Aside from preparing for certain managerial and executive positions, particularly in the metal trades and manufacturing, the reports seem to show that the technical high school courses are unsuited to present demands in these occupations.

4. Since preparatory courses for college or for technical positions differ both in length and kind from trade courses, the two cannot be economically administered together.

5. A separate trade school should be established offering two-year courses to boys over 14. It is estimated that if only half the number who enter the skilled trades each year attended the school, the enrolment would reach at least 800 boys.

6. Boys who do not expect to take a full high school course or who intend to leave at the end of the compulsory period should devote at least a period a week to the study of economic and working conditions in commercial and industrial occupations.

7. Boys under 17 years of age are as a rule unable to find satisfactory employment. Employers prefer to hire older persons.

Those who leave school at 15 waste much of their time during the first two years of employment and acquire unfortunate habits.

The Indianapolis, Indiana, Survey[3]

In 1910, Indianapolis had a population of 233,650. Of the 107,757 wage-earners in the city, 43.7 per cent were employed in manufacturing or mechanical industries, 16 per cent in trade, 14 per cent in domestic and personal service, 9.3 per cent in transportation, and 9 per cent in clerical work. The survey found that about 1,200 young people between the ages of 14 and 16 were employed as wage-earners, while nearly 20,000 young persons between 14 and 20 years of age were not receiving any formal instruction, either in the schools or industry. In addition to training its own population, the city is to a certain extent a training and distributing center for skilled labor throughout the state. Many students are attracted from other sections who are seeking better educational offerings than can be had near their own homes.

Indianapolis supports an academic, a manual training, and a technical high school. Evening classes and all-day vocational courses of an industrial nature are offered in two of the high schools. Manual training, domestic science, drawing and design have been encouraged in the elementary schools. The John Herron Art Institute and the Printing School of the United Typothetae co-operate with the public schools in training for applied design, special art work, and the printing trades.

The situation in Indianapolis very well illustrates the problem of determining upon a proper division of functions between a manual training or composite high school and a technical high school in the same locality. Both schools state in their announcements that they prepare for normal schools, colleges of liberal arts, and technical and engineering institutions. It appears to be quite possible for students in the mechanic arts, household arts, graphic arts, or commercial courses in the technical high school to elect courses which are in every way the equivalent of similar courses offered in the Manual Training High School. The survey says of the latter school:

> "Its courses are being made more thorough and more practical. A closer correlation between shop and classroom

[3] Report of the Indianapolis, Indiana, Survey for Vocational Education, Indiana State Board of Education, 1917. Two volumes.

work is being promoted and the school will act, not only as a center for manual training work, but as a subsidiary center for trade and technical education, especially in evening classes."

The chief difference between the two schools lies in the extension of the work in the Technical High School to include numerous technical trade courses, part-time, and two-year vocational courses not attempted in the other school. The duplication of effort involved in preparing students for college and normal schools, arose largely from the conditions of overcrowding existing in the other high schools at the time the Technical High School was opened. An examination of the course of study of this school shows that it differs only in the extent of its industrial and trade training from many of the composite or general high schools in various parts of the country.

The following statements based on the survey report appear to be significant:

1. Junior high schools are proposed which shall offer four fundamental tryout courses, namely:

(a) Academic
(b) Commercial
(c) Household arts
(d) Industrial, including agriculture

The survey recommends that a prevocational or junior high school emphasizing industrial and agricultural opportunities be established on the extensive grounds of the Technical High School, some of the present shops to be used by the junior high school pupils.

2. The Senior Technical High School on the Technical grounds, should make provision in its organization plan for the following groups:

(a) All-day vocational pupils including those affected by present and pending trade and educational agreements.
(b) Pupils likely to assume in business or in industry positions of responsibility and leadership.
(c) Those pupils planning for careers in business or industry which require not only skill but a relatively large amount of technical knowledge as well. For example, the school should offer junior engineering courses in such subjects

as architecture, electricity, gas, steam, heating and ventilating, chemistry and municipal problems.

(d) Ample provisions should be made for the training of girls and women in those activities in the home and in the industries which the findings of the survey strongly emphasize.

It is recommended that this work be given in all-day, part-time, or evening classes as the occasion may demand in order that the school plant may be fully utilized and its benefits made available to all. In this connection, it should be borne in mind that Indianapolis has neither a technical college nor an extension department which can co-operate with her industries in training employees.

3. The Technical High School should develop an agricultural, industrial, and commercial museum. "This would serve to strengthen the instruction given, focus the attention of the school and the factory on the latest achievements of interest to both, and make possible a permanent up-to-date exhibit, to complement the work done by interested organizations meeting here from time to time."

4. The vocational departments should be extended in accordance with the need for them shown by the demand for technically trained and skilled workers in the industries of Indianapolis.

5. An effort should be made to reach apprentices in the building trades through dull season classes, particularly in the winter months, the instruction being confined to shop training, drawing, and applied mathematics and science.

6. There should be an extension of part-time education and provision for compulsory continuation classes for permit workers. Some of this work will naturally fall within the scope of the Technical High School.

7. Vocational courses should be based upon a thorough analysis of industrial conditions, carried out in co-operation with employers and technically trained men engaged in the industries concerned.

School Survey of South Bend, Indiana[4]

While this survey contains no specific references to the work of technical high schools, it points out very clearly certain faults

[4] Superintendent's Report and School Survey by the Department of Education of the University of Chicago, 1914; pages 138 to 167, "Education for Vocation."

quite commonly found in such schools as well as in general high schools of the type established in South Bend.

> "Speaking generally, it can be said that in the South Bend schools, we find the concrete practical activities on the one hand very largely unillumined with mathematics, science, and design; and on the other hand, we find this same science, mathematics, and design, given without concrete foundation or application. Two things that belong together are found divorced from each other. Neither can be educationally effective in any high degree until they are brought together."

Courses for girls in household chemistry and physics which are closely related to the general home-making courses are now offered in a number of schools, but there is a distinct tendency, due largely to the pressure of college entrance requirements and regents' examinations, to retain traditional methods in science, mathematics, and, to a less extent, even in drawing.

Another recommendation of this survey concerns the shopwork offered for boys.

> "In a city where 50 per cent of all the men are employed in manufacturing and mechanical pursuits, and in a nation where an equal proportion of the men are so employed, it is certain that, not only should wood-working be developed along the lines already suggested, but other lines of work should also be introduced. There should be established immediately, further courses involving work with metals, particularly steel and iron."

It is a common occurrence to find cities where courses in wood-working are offered through two years of the elementary grades and continued for two years or more in the high school. Thus in Minneapolis in 1916 wood-working was given for five successive years from the sixth grade through the first two years of the high school. The Stuyvesant High School in New York City in 1918 had no first- or second-year students in metal-working shops, and the small amount of equipment provided for advanced students afforded only a meager experience. There is certainly no adequate justification either in educational theory or industrial demand for such a procedure.

Vocational Education Survey of Minneapolis, Minnesota (1915)[5]

Minneapolis has five general high schools, each of which gives courses in manual training, drawing, domestic science and domestic art, and commercial branches. The Girls' Vocational High School and the Dunwoody Industrial Institute give practical and technical training for students of secondary school age. The Survey concludes with respect to manual training courses in the high schools:

1. About two-thirds of the 49 graduates of all courses who expected to attend the engineering school of the university came from the manual training courses. Of 149 graduates of the manual training courses, only 14 planned to enter occupations for which the work of the school had been a direct preparation. These facts, considered in connection with the very small amount of total time spent in the shops, drafting-rooms, and laboratories, appear to indicate that the courses cannot be said to function directly in vocational preparation.

2. The prevocational value sometimes ascribed to manual training courses is of comparatively slight consequence to students in Minneapolis because:

(a) The majority of the pupils who would profit most from the opportunity to try themselves out in several lines of work drop out during the first two years.

(b) The variety of opportunities is too limited in scope and the trades represented are not those in which many students will later engage.

3. The intermediate school or junior high school is the best administrative agency yet devised for meeting the need of training in the manual and industrial arts for adolescent boys and girls. The training in each of these arts should be varied in kind and grade, but should be sufficiently constant for a considerable time to meet the varying interests and requirements of different groups. This training should enable individual pupils to select the kind of work for which they are best adapted.

4. Short courses designed to meet the vocational needs of elementary school graduates should be offered in the high schools. Where

[5] Vocational Education Survey of Minneapolis, Minnesota, Bureau of Labor Statistics, United States Department of Labor, Bulletin, Whole No. 199, 1917. Pages 41 to 82, vocational work in the high schools; pages 431 to 538, various phases of vocational and technical education.

the need for such training is apparent, pupils of the first two years in high school should be admitted to vocational courses now reserved for pupils in the third and fourth years.

5. Certain of the high schools should specialize in some field, at the same time retaining the present general program of studies. A technical course is proposed for the Central High School intended to offer training for boys who desire to enter industry on the business and directive side.

6. An advisory committee of business men should be established to assist the high schools to standardize their training and adapt it to changing commercial demands. Such a committee would be especially helpful in promoting the efficiency of the commercial and shop courses.

School Survey of San Francisco, California (1916)[6]

Of the five day high schools in San Francisco, one admits girls only and four are coeducational. Two, the Polytechnic High School and the High School of Commerce, were established as specialized schools but they have gradually enlarged the scope of their activities until both are strongly college preparatory and neither is strictly technical or commercial. Some attempt has been made to allow students enrolled in one high school to take special work offered in another, but the location of the schools and other factors have operated to make this practice unsatisfactory.

The survey encourages the tendency to establish general curricula for all the high schools and favors the abandonment of the special school for girls.

> "In the country as a whole there has been very little popular demand for a policy of separating the sexes in either elementary or secondary schools. If there exists any justification for a separate public high school for girls, it is to be found in the desirability of providing an institution in which the problems of preparing girls for home-making, motherhood, and other functions peculiar to womanhood may receive such special attention as is not possible or

[6] The Public School System of San Francisco, California. United States Bureau of Education, Bulletin, 1917, No. 46.

> practicable in the usual coeducational school. In the opinion of the survey commission this justification does not exist."

The report recommends the opening in all high schools, of evening classes which will provide instruction in English and citizenship for foreigners, cooking, sewing, mechanical drawing, stenography, typewriting, bookkeeping, penmanship, arithmetic, printing, and such other subjects as the industries of the city of San Francisco seem to demand.

Curricula that shall be substantially uniform for all students for the first two years are advocated for all high schools. Specialization, under faculty direction, is to be allowed in the last two years.

> "Unless the curricula are fairly uniform and unless they are all-inclusive, there is great danger of developing unpleasant class distinctions and stratification of groups and a real social cleavage in the total high school body of the city. All such results are regarded as disastrous and antagonistic to the highest welfare of a democratic society."

The report points out that more attention should be given to the industrial, manufacturing, and commercial life of the city in planning the high school courses. The section on vocational education recommends the offering of various vocational courses but declares that "the attempt to prepare for college through these vocational courses should be definitely abandoned."

School Survey of Fall River, Massachusetts (1917)[7]

Fall River has a population of about 125,000. The manufacture of textiles is the only industry of great importance. Two coeducational high schools are supported by the city—the B. M. C. Durfee High School, a classical preparatory school, and the Technical High School, organized in 1913. The Bradford Durfee Textile School, incorporated in 1899, is the only other school offering technical

[7] Unpublished Report of the Fall River Survey made by the Harvard Division of Education under the direction of Dr. Ernest C. Moore. Section on Secondary Education prepared by Professor Alexander Inglis.

training to persons of secondary school age. Its activities are limited almost wholly to vocational courses connected with the textile industry.

The following are significant recommendations from a report on the public schools prepared by various members of the Division of Education of Harvard University:

1. Only 2,125 out of approximately 10,000 children of ages 14 to 18 were enrolled in school in 1917. Much of this elimination is ascribed to the kind of instruction offered in the upper grades of the elementary schools. The establishment of junior high schools is recommended as a means of overcoming this situation as well as a practical way out of various difficulties including the problem of overcrowding in both elementary and secondary schools.

2. Although the two high schools are located in adjoining blocks, they are under separate management and no arrangements have been made for pupils in one school to take work in the other. This has given rise to several unfortunate features:

(a) Pupils in the B. M. C. Durfee High School are denied any opportunities for shopwork, home economics, mechanical drawing, applied design, or art work; while Latin is not offered for college preparatory students in the Technical High School.

(b) Traditional regard for the type of instruction given in a classical high school has interfered with the educational guidance of graduates from the grammar schools and has set up an undemocratic social distinction between the two schools.

(c) The expense involved in the duplication of administrative officers, heads of departments, and laboratory facilities in the two schools is largely needless.

(d) There is an excessive number of small classes, particularly in the last two years of the Technical High School. This is largely due to an unnecessary duplication of college preparatory classes in the two schools.

(e) Pupils in either school who discover that they have chosen a course unsuited to their needs or abilities cannot be transferred readily to the other school.

For these reasons it seemed advisable to the survey staff that the two schools be placed under one management, that curriculum heads replace department heads and serve both schools, and that the programs be so arranged that pupils in one building could take part of their work in the other. Such a reorganization would prob-

ably reduce the total teaching staff by eliminating numerous small classes.[8]

3. No definite agreement as to what should constitute the field of service of the Technical High School had been reached by the school authorities in Fall River prior to 1917. The reorganization of the curricula proposed by the principal at that time and approved in general by the survey is as follows:

Technical Courses for Boys

Technical A Course: for boys definitely planning to enter a higher technical school or college, engineering departments of colleges, and scientific courses in colleges.

Technical B Course: for boys wishing to enter a trade or branch of industry immediately on leaving school.

Technical Courses for Girls

Technical A Course: for girls preparing for home-making employments, higher domestic arts schools and colleges, and for state normal schools.

Technical B Course: for girls whose education will not extend beyond the high school and who look forward, directly or indirectly, to managing a home.

Technical C Course: for girls with special talent for art and those preparing for applied arts courses in higher institutions.

Courses for Both Boys and Girls

Clerical Course: for boys and girls preparing for positions in the business world as stenographers, bookkeepers, clerks, secretaries. It is also preparatory for normal schools, business departments in higher institutions, secretarial and library courses in higher institutions.

Business Course: for boys preparing ultimately for the more responsible positions of business life. The course emphasizes salesmanship, advertising, business organization, and accounting.

The organization of junior high schools and the consolidation of the two high schools would naturally lead to certain modifications of this general plan.

[8] This recommendation has been adopted by the Fall River School Committee and the two schools are now administered as one.

APPENDIX B

APPRENTICE SCHOOL OF THE LAKESIDE PRESS

The apprentice school of the Lakeside Press, R. R. Donnelley and Sons Company, Chicago, was established July, 1908, on the basis of an examination of the work done by the apprentices of the Chaix Printing Company of Paris, France. The object of the school is to train competent workmen who will have a thoroughly practical and theoretical knowledge of the business. The boys not only receive the necessary trade education but also a general academic training which is the practical equivalent of the work done in a high school. It is expected that some of them after careful selection and a period of experience and trial will be able to fill responsible positions in the factory or counting-room.

The school occupies a special room, half of it equipped as a model composing-room and the other half as a classroom. Four instructors are provided: a supervisor who gives a part of the academic work and has general oversight of the boys in the factory, an instructor in printing who also has charge of the trade instruction in the school, an instructor in presswork who has supervision of apprentices in the pressrooms, and an instructor in drawing and design. Applicants for admission must be grammar school graduates between 14 and 15 years of age. The school record must show good standing and excellent moral character. Before an applicant is finally accepted his home is visited by the supervisor and his parents or guardians promise to co-operate with the school in securing prompt attendance, devotion to studies, and good quality of work.

The apprenticeship course is divided into two periods. The younger boys serve a probationary period of two years, spending half their time in school and half in the factory. Students in this course are divided into two groups, graded according to their standings, and both groups spend three and one-half hours daily in school and four and one-half hours in the school shop or doing work connected with the factory or the offices. Those who successfully

complete the preapprenticeship courses enter upon a five-year apprenticeship period.

Throughout the term of apprenticeship very close co-operation is maintained between the home and the school. The parents receive monthly reports and occasional visits are made to the homes by the supervisor or one of the instructors. The monthly report contains specific statements regarding the boy's work in the shop, all standings being based upon the quality and quantity of work performed. It is largely due to this feature of the school's work, coupled with the careful initial selection of the apprentices, that the Lakeside Press has succeeded in graduating 68 boys from the seven-year course, a total of 57 per cent of those who enrolled.

Special courses are offered for high school graduates, the time limits depending upon the individual's ability, the kind of work done during the high school course, and the amount of previous experience. Evening classes meeting from 5:45 to 7:15 P.M. are offered for apprentices in the bindery and photo-enlarging departments.

The following outlines suggest the kind of work done in the probationary and apprenticeship courses.

Course of Study for Preapprentices

First Year

A—Academic

Spelling: Lists of words used in the different departments with the accepted trade definitions, geographical names, lists of words commonly misspelled, selected lists from the Printers' Speller.

Grammar: Composition based upon the technical work so that every exercise is a lesson in composition. Attention is given to English in mathematics, science, and design classes. Proof marks are used in correcting all exercises.

Correct Usage: Letter-writing, copy-writing, preparation of copy for the printer, poetry and how to set up poetry in type.

Reading: Study of vowel and consonant sounds, chart of diacritical marks with key words, use of dictionary, correct articulation and enunciation as the basis of pronunciation, practice in oral reading to train copy-holders for the proofrooms. Each student is required to read and report upon at least six volumes of standard literature.

B—Academic, Technical

English: Spelling, capitalization, punctuation, division of words, quotation marks, rules for compositors.

Proofreading: Marks used and their significance, extensive practice in reading proof, signs used in printing or use of special punctuation, reference and commercial signs, the use of accents, and medical and technical terms.

Type: Composition of type metal, type sizes, point system, punch, mold, matrix, and nick, various styles and sizes of type and the methods of measuring and computing, the cost of composition.

Paper: History of the manufacture, kinds, sizes, weights, and uses of paper.

C—Trade Practice: The layout of a case, how to set and hold the composing stick, elementary type-setting, spacing, justification, taking proof and correcting the type in the stick.

Second Year

A—Academic

History of printing in England and America, elementary study of electrotypes, stereotypes, half-tones, and zinc plates.

Principles of composition including determination of a well-proportioned page, elementary design, computation of amount of stock and cost for a given job. Principles of the linotype and monotype.

B—Trade Practice: Study of book-making, including position of type on a page, setting half-titles, title pages, copyrights, and imprints, preface, and table of contents. Running heads, quotations, footnotes, reference marks, insertion of engravings.

C—Art Work: Layouts for catalogue pages, advertisements, cards, title pages, and covers; elementary conventional design for monograms, trade-marks, head-pieces, and ornaments.

Study of Colors: Color-mixing, harmony, color schemes, and the use of colored inks on tinted papers.

Trade Course for Apprentices

Composing-Room

First Year

Non-productive work to familiarize the apprentices with factory routine, based upon the work done during the preapprentice term. Proving job work. Handling materials: sorts, leads, slugs, rules, furniture; distribution of job type to learn type faces thoroughly. Composition: plain matter; job composition.

Second Year

Composition: tabular or catalogue to train apprentices in close application and constructive work. All work under direct supervision of the shop instructor.

Third Year

Composition: job; commercial catalogue; book; make-up. The apprentices are rotated on different classes of work to determine their future specialization.

Fourth Year

The apprentices are finally worked into the department for which they show the greatest interest and aptitude. Operators for linotypes and monotypes selected.

Fifth Year

Specialization in the department selected. Layouts to develop originality and character in their work. As journeymen, placed in the department where they show highest efficiency.

Five-Year Academic, Technical Course for Apprentices

Pressrooms

Presswork: Object of; terms used; materials; paper, forms, inks, rollers.

The Press: Parts of: the bed; the cylinder; the bearers; the fountain; the delivery; the feed-board; the grippers; the air chamber

and the plungers; the brushes and bands; the rollers: composition, care of, effect of weather or climate upon, value to printed result.

THE FORM: Materials of; cleanliness of bed and back of form; position on bed; position to gripper edge; height of; correct lock-up; correct imposition.

THE STOCK: Folding according to grain, right or wrong side, finish, register, color.

THE INK: Composition; quantity; defects in inking; good color; reliability of the eye; deception of the eye; safeguards, uniformity maintained by means of O.K.'s. Offset, how to prevent.

THE FEEDER: Duties of: handling the stock; feeding to guides; cleanliness.

THE PRESSMAN: Duties of: make-ready; the care of the press; watching the job.

COLOR: In a pressroom, the term color means ink, or the quantity of ink used, not necessarily colors as ordinarily used; for example, black ink properly distributed on white paper is said to be "good color," not enough ink would be called "light color," and too much ink "heavy color." Color contrast. Colored stock, effects of. Primary colors: yellow, red, blue. Daylight and darkness. Mixing colors to secure secondary colors, tones, and shades. Transparency of colors as used in process work; superposition of colors. Cleaning the press for colors.

APPENDIX C

EDUCATIONAL ACTIVITIES OF THE GENERAL ELECTRIC COMPANY

The educational activities of the Schenectady plant are carried on in two divisions: (1) the apprentice school, and (2) a group of other educational activities to be enumerated later. The work of the apprentice school is under the supervision of a director who reports to the general manager of the Schenectady plant. The other educational courses are controlled by a local commitee which in turn is under the general supervision of a committee made up of one representative from each of the General Electric plants. The general committee reports to the president of the General Electric Company, who controls the finances available for educational purposes.

The Shop Apprentice System

Boys between 16 and 18 years of age who give satisfactory school references and are acceptable to the company may enroll in apprentice courses offered for machinists, draftsmen, molders and coremakers, and blacksmiths. After serving a probationary period varying from 30 to 60 days, an apprentice agreement is signed covering a four years' period of training. Machine-shop apprentices begin work in a special training department under shop instructors, where they remain for a length of time varying from one to two years before being transferred to the works. The output of the training department is all of a commercial nature so that the work is thoroughly practical from the beginning. After being transferred to the machine-shops or toolrooms in the plant, the apprentice remains under the supervision of the apprentice department, which co-operates with the shop foremen and department instructors. Apprentices in the foundry and blacksmith shop begin work at once in the plant shops side by side with regular workmen. Draftsmen spend their

first year in the blue-print and tracing departments, the second in the shops, and the third and fourth years in the drafting departments. During the fourth year two weeks are spent in the physical testing laboratory. Machinist and draftsman apprentices spend two hours a day for two days a week in classroom study. The subjects include mathematics, mechanics, practical talks by shop men, and mechanical drawing for machinists.

Courses Under the Educational Committee

1 .Student Course for Technical Graduates:

Young men who have a technical college training or its equivalent may enroll for a year's course in the testing department, to be followed by further work in special extension courses open to men with marked ability who desire to specialize in various departments of the electrical industry. The first year's course at Schenectady includes a three months' assignment in one of the designing, departmental, manufacturing, or commercial sections. At the Pittsfield works, the remainder of the year is given to regular testing department work in the local plant. Students are required to attend lectures by the company's department heads and other authorities upon subjects relative to engineering or the commercial and administrative aspects of the electrical industry.

2. Evening Vocational School:

Evening schools are conducted inside the works exclusively for employees and convene immediately at the close of the working day. They are under the joint jurisdiction of the company and the city board of education. Tuition and books are free to students attending 80 per cent of the sessions. The following courses are offered:

(a) Accountancy
(b) Business administration
(c) Business arithmetic
(d) Business English
(e) Stenography
(f) Typewriting
(g) Phonograph dictation

3. Stenographic Vestibule Training Class:

This class is organized for training all stenographers entering the employ of the General Electric Company's Schenectady plant, to give them a knowledge of office practice of the company. The work covers two weeks.

4. Evening Classes at Union College:

During the 1917-18 college year, 85 per cent of the evening students at Union College were General Electric employees, 142 being enrolled. The company refunds half of the tuition fees of employees whose attendance records are 80 per cent or better. The following courses enroll the majority of those in attendance:

(a) Mathematics
(b) Physics
(c) Chemistry
(d) Economics

5. Postgraduate Course at Union College:

A limited number of qualified graduates of colleges and universities may obtain a Master of Science degree in electrical engineering through a special course arranged for employees of the General Electric Company. Classes meet at the college Friday mornings from 9 o'clock until noon. The course may cover a period of two or three years. The company refunds $40 of the fee of $75 charged for tuition and the degree.

6. Comptometer School:

A class for clerical employees meets four evenings a week between 5 and 7 p.m. The company provides an instructor and serves supper on the evenings when the class meets.

7. Testing Department Course:

A two-year departmental course for young men having less than college preparation. The course consists of work in the shop, where the boys are under individual instructors, and of classroom exercises of one hour or more each week.

The instruction includes lectures on direct- and alternating-current theory and training in the use of machines and instruments for testing of the slide rule for engineering calculations. Many of the students attend night school, the vocational schools, or the Union College courses, in addition to the work offered by the company. Students spend 50 hours a week in the shops, attend classroom one hour or more a week, and are paid for 51 hours of work. For every week in which the time record is perfect, they are paid for 52 hours.

8. Course for Switchboard Department Testing Men:

Similar to the course described under 7 above. The course allows two hours each week of classroom instruction on the company's time.

9. Course for Women Technical Assistants:

These courses were established during the war period for training young women college graduates for commercial and semitechnical careers in the electrical industry. During the three months' probation period, students attend class one hour each day, the instruction dealing with apparatus, theory, and departmental organization and routine. Later in the course technical lectures are given on electrical theory and the practical methods in use in the shops. The majority of the young women are being trained to enter the estimating and cost accounting departments; so the latter portions of the course emphasize manufacturing costs, specifications, quotations, contracts, and other details of estimating and cost accounting.

10. Local Evening Schools:

Classes to which all General Electric employees are eligible are held in the evening at three Schenectady public schools and at the high school. Tuition and text-books are free of charge. The number of employees enrolled for the year 1917-18 was 877. The elementary courses are for boys between the ages of 14 and 16, who must attend 50 nights a year under the compulsory education law. The high school

classes are held from 2 to 4 hours each week and provide the following courses:

Spanish	Mechanical Drawing
French	Architectural Drawing
German	Shop Mathematics
Algebra	United States History
Plane and Solid Geometry	
Trigonometry	For Girls only:
Mechanics	Cooking
Applied Electricity	Dressmaking
Electrical Engineering	Millinery
Chemistry	Physical Training

APPENDIX D

THE SOLVAY PROCESS COMPANY TRAINING SCHOOL

The Solvay Process Company, Solvay, N. Y., conducts a school with the aim of developing foremen in special departments, laboratory and drafting department men, and also employees who fit into other special work in the plant. The students spend one week in the school and the alternating week in the plant and are paid both while attending the school and while working. Except in cases where the students are of exceptional ability or have had satisfactory previous education, they are expected to remain in the school two years. Each year is divided into three terms of four months' duration, so that students entering at various times during the year may be properly placed upon enrolment. Emphasis is placed upon giving the students enrolled general education in addition to technical training for the work of the Solvay Process Company. Only one full-time instructor is employed, thus making it necessary to divide some of the class periods into two sections, one having a class exercise while the other is engaged in individual study. The following duties are to be undertaken by the supervisor in addition to carrying out the daily program of the school:

1. Examination of applicants and investigation of their public school record and home conditions.
2. Keeping records of students and graduates.
3. Attend, by reports and personal consultation, to boys' transfers and troubles with superintendents, foremen, and men.
4. Change of courses and additional new work as school grows.
5. Take students on tours of inspection.
6. Keep school committee informed, by meetings and reports, of school's progress and submit changes and extensions.
7. Keep informed as to boys' home conditions and as to general conduct outside of working hours in co-operation with parents.
8. Extension work among graduates.
9. Extend, by blue-prints, charts, and descriptive text the special work in the school for class and individual instruction.

Hours	Monday	Tuesday	Wednesday	Thursday	Friday
8–9	Report writing on previous week's work in plant. Students are required to make sketches and give explanations of tools, machines and apparatus used. They are also required to compare notes from different departments. Individual Instruction in English Composition. References made to the correlation between courses in school and the work in the plant.	Chemistry Class Instruction 1st Year Class Individual Study 2nd Year Class	Physics Class Instruction 1st Year Class Individual Study 2nd Year Class	Mathematics Black-board work by Students	Physics Class Instruction 2nd Year Class Individual Study 1st Year Class
9–10		Chemistry Class Instruction 2nd Year Class Individual Study 1st Year Class	Mathematics Individual Instruction	Electricity 1st and 2nd Year Classes receive alternate Class and Individual Instruction during this period	Shop Problems Speeds, feeds, etc. Estimate of work.
10–11		Mathematics Individual Instruction	Mathematics Problems, Class Instruction	Lecture and Shop Problems on Power and Power Transmission	Lecture on: Coal, Iron, Steels, Metallurgy, Selection of Materials
11–12		Mathematics Problems, Class Instruction	Individual Study	Industrial History, Civics, Economics, Commerce, etc.	English Composition pertaining to Shop and School Work
12–12:30	Lunch	Lunch	Lunch	Lunch	Lunch
12:30–2	Mechanical Drawing	Individual Study	Lecture On: Safety First, Fire Prevention, Health Conservation, Hygiene, etc.	Free-Hand Drawing Sketching, Reading of Blue-Prints	This period reserved for lectures by experts from different departments 1 hr.
2–3	Physical and Commercial Geography	Review of works Reports Discussions and Problems	Individual Study		Reading Period Current Events Magazines Library Books (1½ hr. Individual study)

Figure 71. Schedule of Instruction for the Solvay Process Company Training School

The school week of 32½ hours is divided as shown in the accompanying schedule of subjects. Only the minimum hours for each subject are given below. During the period set aside for individual study, students are assisted in their weak subjects and special work is done which applies directly to each student's tasks in the plant.

Class instruction:		
Report-writing with discussions and corrections; English composition	5	hours
Mathematics, including shop problems	7	"
Mechanical drawing	1½	"
Free-hand drawing, sketching, and reading of blue-prints	1½	"
Chemistry	2	"
Metallurgy and selection of materials	1	"
Physics	2	"
Electricity	1	"
General education	5	"
	26	"
Individual study	4½	"
Total	30½	"

APPENDIX E

EDUCATIONAL WORK OF MONTGOMERY WARD AND COMPANY

The educational director of Montgomery Ward and Company recently made the following statement concerning the educational work conducted by the company.

"After three years of study and experimentation on educational work in our plant, we have definitely arrived at a policy of putting 90 per cent of our expenditure and energy in educational work into what we call 'plant instruction.'

"Our plant instructor has a duplicate section of a merchandise division in which standardized merchandise bins and tables are installed. Newly employed persons, hired for such positions as pricing, stock-keeping, order-filling, checking, wrapping, and packing, are given from one-half day to a day preliminary instruction before going to their duties.

"The educational department, through the plant instructor, controls the education of men and women hired for executive positions. These men and women are sent through the plant, working a certain number of days in each division until they are fully conversant with our various operating activities. At the same time their work and characteristics are closely observed so that they can be placed in positions for which they are best fitted. This form of education lasts from two weeks to two months, depending upon the individual's experience, ability, and prospective value.

"We maintain a school for typists under competent instructors, having classes six hours per day in the simplest forms of typing, such as filling in form letters, etc. During the balance of the day these girls perform their regular duties and are paid for full time.

"In our correspondence department, supervising instructors take charge of new employees and teach them our system and policy of correspondence. These are the chief activities in plant instruction at present, but it is continually broadening and developing.

"Aside from plant instruction, we provide, from September to

June, evening classes for young women to learn typing, stenography, English and arithmetic, and for young men to learn English, arithmetic and the general principles of our business. We do not believe that these evening classes are of great value to the mass of our employees; the percentage of attendance is very low—perhaps an average of 200 persons out of 5,000—but they serve an excellent purpose in that they bring to light the more ambitious employees who are willing to sacrifice their time evenings to advance themselves. The instructors are all persons in executive positions and the director of the evening classes is connected with the employment department; thus, we are able to discover promising material worthy of advancement and such people get ahead very quickly.

"To sum up, after several years' experience, we are of the opinion that in an industrial establishment like ours which employs almost no illiterate people, there is no necessity for the teaching of subjects that are taught in the public evening schools and that the only advantage in teaching such subjects is to get in touch with the more promising material among our employees.

"Most of the men and women holding such titles as 'Educational Director' or similar positions in commercial institutions are idealists, sincerely endeavoring to carry out plans for the betterment of the employees in their establishments, but failing to consider the subject from the dollars and cents' viewpoint of business. As a result, their efforts, while well meant, cause a duplication of what can better be done in the public evening schools and a corresponding failure to accomplish practical instructions of tangible value to the employee and the company in the operation of the business."

APPENDIX F

STANDARD PRACTICE FOR OPERATIVES OF THE VESTIBULE SCHOOL OF THE HOOD RUBBER COMPANY

The accompanying extract from a standard practice sheet for operatives in the making-room of the Hood Rubber Company, Watertown, Massachusetts, is an illustration of the detailed process descriptions necessary for the information of instructors. Where time studies or job specifications have been written, some data will already be available upon which standard practice can be based. In any case, some additional investigation will be necessary in order to put the work in its proper teaching form. For the use of the instructor a check list of the operations to be performed, given in the sequence in which they are to be taught, may be sufficient. After the pupil has been given some preliminary training, the check list may be placed in his hands to enable him to check his movements or to determine whether the process is being carried through in the right order. For the use of pupils, standard practice sheets may be improved by being illustrated with diagrams or photographs so that the steps presented may be clarified for those who do not readily follow the statement of the printed page.

The following outline gives only the first four of the eleven operations involved in the making processes of a standard rubber shoe.

After the material has been arranged on the table, the worker is instructed to proceed as follows:

"1. Place right hand on lower right-hand corner of pile of linings, picking up lower right-hand corner of top lining with left hand, carry left hand to left, stripping lining one-half off and fold; place left hand at top of pile of linings, grasp fold of lining at top with right hand, stripping off by pulling up; carry right hand forward and place lining on table with fold at top right.

"2. Place left hand on pile of rough quarters above top one; with right hand pick up top quarter, forefinger underneath top of

quarter; with right hand carry rough quarter to lining and with left hand press it in place on lining. With left hand pick up lining and turn over from right to left; with right hand fold quarter over and with left hand press it into place on lining. Pick up roll with right hand and roll once back and forward returning roll to place in tool-box; left hand meanwhile holds lining, then pick it up, and with the aid of right hand spread it apart.

"3. With right (or left) hand reach for and bring last to table, holding lining toe up, in other hand. Last is laid, toe away, and lining drawn over with one hand at the toe and the other at the heel. Rest shoe on toe of last and draw heel of lining into position with both hands. Hold toe over with left hand, bottom away, last resting on back of heel.

"4. With right hand, pick up insole and place on bottom of last. Hold insole in place with last two fingers of right hand and last left side of lining over with left hand following up with first fingers of right hand; thus to shank. Last right side of lining in similar manner. With right hand pick up roll and roll once around from right side of shank around toe to left side of shank, holding shoe with left hand, and replace roller. Drop toe forward and with left hand, raise heel; with right hand pick up gauge and confirm height of back, then return gauge; carry heel forward with left hand and with thumb and forefinger of each hand crease insole at front edge of the heel. With right hand last over right side of heel, then last left side over with left hand, in each case finishing lasting of shank. With right hand pick up roller, pound shank, (once on each side) and roll up left side across back and down right side of heel. Return roller with right hand and with left hand lay shoe on side, back at left, and bottom away."

APPENDIX G

EMPLOYEES' ASSOCIATION OF THE MORSE DRY DOCK AND REPAIR COMPANY

The Morse Dry Dock and Repair Company of New York has introduced an employees' association (February, 1919) under circumstances which appear to meet the majority of the standards set up in Chapter XVII. The company employs about 6,000 persons, engaged in the usual kinds of work involved in repairing both steel and wooden vessels. A little more than two years ago, notices were sent out by the company and posted on all the bulletin boards in the yard, to the effect that an association of employees would be formed and calling for an election by departments of directors to represent the men. For the purposes of this election, the yard was divided into ten departments, each electing one director. After the directors had been chosen, a mass meeting of the employees was held, at which the association was formally proposed and a president, vice-president, secretary, and treasurer were elected for a term of one year. These officers, together with the directors, made up a board of directors for the employees' association.

The constitution adopted by the association provides that the membership shall include all employees of the company. As soon as a man terminates his contract with the company, his membership automatically ceases, but it is renewed as soon as he is re-employed. The dues are five cents per week for each member, deducted in advance from his weekly wage. Provision is made for monthly mass meetings of the employees comprising the association, as well as for monthly conferences of the board of directors, and of special committees.

The special committees, appointed by the board of directors, have charge of several important matters. The relief committee establishes and maintains a fund from which benefits are paid to members in case of sickness or disability and to their dependents in case of death. The relief fund is maintained by dues from members of the association who wish to participate in the plan. The accident

prevention committee investigates injuries sustained by any employee of the company while engaged in the performance of his duty and co-operates with the management in reducing the number of accidents. A finance committee audits all bills, the entertainment committee arranges for balls, picnics, and athletic games, and the sanitation committee investigates complaints from the several departments and co-operates with the management in improving conditions within the plant.

A plan of insurance has been adopted by the association by which an outside insurance company reinsures all employees and their doctor handles all compensation cases. The policy covers accident, sickness, and death benefits. The association pays the salary of the insurance clerk out of special dues paid voluntarily for this specific purpose by those who wish to receive the benefits of the plan.

A conference board has been chosen for each department, composed of the director and two additional members elected at the same time and for the same period as the departmental director. In case the employees of the department desire some change in the conditions of employment which affect the entire group, the matter is submitted first to the conference board, and by them to the "industrial director" appointed by the company to handle requests of this sort. In the event of failure to adjust the request within 48 hours after it has been received by the industrial director, the request is referred for adjustment to a joint conference board composed of three members of the department concerned and three officers appointed by the company. In case the joint conference board cannot adjust the dispute, a disinterested person is selected as umpire. The decision of the board or the umpire is final and binding upon the company and the employees of the department. A considerable number of minor grievances are still being handled by the employment manager, but all important affairs are being referred to the conference board. For handling certain matters of this kind, the association has established an efficiency department, consisting of three elected members who investigate all infringements of rules approved by the membership. The three members who comprise the committee sit as a board to decide all matters which may become a cause for controversy.

In addition to the opportunity for discussion which arises from monthly meetings of committees and directors, the company provides

for regular foremen's meetings to discuss the usual list of management problems. These meetings are attended by the "snappers" or gang leaders, as well as by the heads of departments. All of this work receives constant attention from the employment manager and one of his assistants. The insurance clerk has his desk in the employment department, the employment manager attends all committee meetings, and in various other ways keeps in close touch with all that goes on, endeavoring in every reasonable way to further the best interests of the association.

APPENDIX H

WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY'S CLASSIFICATION AND RATES FOR EMPLOYEES

Standard Occupations and Rates for Women Office Employees

Instructions to Department Heads

Classification

1. This book contains a classification of the occupations used in your department.
2. This classification has been made by a comparison of the same occupations in all departments.
3. The following descriptions of the various classes give a general idea of what each class covers.

Class A

4. Woman performing duties of a higher grade than those outlined under Class B. Each Class A position is to be approved by the Occupation and Rate Committee. The classification sheet for each department will specifically state what Class A positions have been authorized.

Class B

5. Woman with expert skill or special knowledge which can only be obtained by several years' experience.

Examples: Expert stenographer or dictaphone operator; typist with considerable figuring experience; expert calculating machine operator; checking clerk, familiar with freight classifications; expert manufacturing information writer; Hollerith machine operator; special bookkeeping machine operator.

6. Woman with initiative, judgment, and responsibility, able to handle much of the office work without supervision; work of an analytical quality. Should be able to give information and handle work which is not routine. If a stenographer, able to handle correspondence with outside parties and answer some letters without dictation. One to two years to attain reasonable efficiency.

   Examples: General clerk or stenographer.

Class C

7. Woman with either skill or special knowledge obtained by previous experience or training. Work is mostly routine, but demands some initiative, responsibility, and accuracy. Six months to a year to attain reasonable efficiency.

   Examples: Stenographer or dictaphone operator; typist not straight copying; calculating machine operator on adding and listing machines; inspecting mail; writing manufacturing information; in charge of files; statement clerk; experience tracer; telephone operator.

Class D

8. Woman who in short time can become efficient on work requiring either skill or knowledge of detail which is of a routine character. In general, the type of employee that can be promoted to a higher class. Three to six months to attain reasonable efficiency.

   Examples: Stenographer beginning; typist on straight copy-work; pay-roll clerk; simple calculating machine work; filing original data; keeping card records; production diaries and charts; ordering material from manufacturing information; tracer; timekeeper; shipping and stock-order reports; working up costs; telephone operator.

Class E

9. Woman or girl beginner with no previous experience or training; work not requiring much initiative, accuracy, or responsibility.

Examples: Mail clerk; tube operator; filing duplicate matter; withdrawing from files; assembling for files; recording promises and orders; duplicator operator; errand girl; assistant to timekeeper.

Range of Rates

10. Positions are classified according to the training, experience and skill necessary to do the work; a definite range of salary being applicable to each class.
11. In general, the lower rate listed for any class of work is to be taken as the hiring rate. The higher rate is to be used only for the most experienced in the class.
12. The head of each department has been furnished a confidential "Key Sheet" which gives the range in salary for each class. The rates listed on the "Key Sheet" are independent of any special bonus which may be authorized by the company.
13. In very exceptional cases it may be advisable to pay an individual a higher rate than specified for her class. All such increases will be referred to the acting vice-president, for approval.

Employment

14. All employment of women for office positions will be made through the women's clerical division of the employment department. A notification of the help required is to be sent to that department on "Request for Help Card."
15. After an applicant has been accepted by the head of the department and is ready to report for work, she will be conducted to the department making the request, accompanied by card, which will bear the signature of the employment department. This card is then to be signed by the head of the department and forwarded by him to the salary record division.

Re-Rates

16. The employment department card is to be made out by the department in which the individual is employed and after the necessary approvals of that department have been obtained, is to be forwarded (except for authorized Class

A employees) to the secretary of the occupation and Rate Committee for checking and forwarding to the salary record division.

17. In filling out a "Re-Rate Card" for a person who is in charge of other employees in a supervisory capacity, indicate the standard name of the occupation first, followed by the words "In Charge." The next higher classification may be allowed for one who is in charge.
18. Except in case of transfer, all re-rates become effective as of the first of the month.

Transfers

19. Whenever possible the higher class occupations, requiring skill, experience, or special ability should be filled by promotion or transfer, even though it may be necessary to transfer an employee from another department.
20. When an employee desires a transfer, she will take the matter up with the party in charge of her work. If the matter cannot be adjusted or arranged by transferring the employee to another position within the jurisdiction of the head of the department in which she is working, the women's clerical division of the employment department should be notified by means of "Report on Employee" furnished in duplicate. In case the matter is adjusted so that the employee no longer desires a transfer, the report will be returned by the employment department with a notation to the effect that the request for transfer is cancelled.
21. When one department wishes to obtain the transfer of an employee from another department, the matter is to be taken up with the head of the latter department and with the women's clerical division of the employment department before the employee is in any way approached.
22. When a transfer has been arranged, the women's clerical division, employment department, will make out the necessary transfer cards and forward them to the departments concerned. Each department will forward the card it receives, bearing the necessary signature, to the salary record division, accounting department.
23. Transfers must be arranged so as to be effective as of the 1st or 16th of the month.

APPENDIX I

APPRENTICESHIP INDENTURE PREPARED BY THE INDUSTRIAL COMMISSION OF WISCONSIN

THIS INDENTURE, Made in triplicate this..................day of...................., 19.., between..........................., hereafter called the first party, and..........................., a minor, born.................., of............................,
(date of birth) (Street and number)
Wisconsin, and......................................., hereafter
(Name of parent or guardian)
called the second parties;

WITNESSETH, That the first party agrees to take the said minor into its employ and service as an apprentice to teach him the trade of............................as per Exhibit A.

That the second parties agree that the said minor shall diligently and faithfully work for and serve the said first party during the full term of apprenticeship.

The apprenticeship shall begin on the.................day of ...., 19.., and shall be for a period of....... years. The length of year, the compensation for the term of apprenticeship, and the processes, methods, or plans to be taught shall be as per Exhibit A.

It is mutually agreed that until the minor's eighteenth birthday the total number of hours' work in any one week shall not exceed fifty-five (55), and that at least five (5) of such hours or its equivalent[1] shall be devoted by said minor to school instruction.

(This clause shall not be construed to prevent school instruction after the minor's eighteenth birthday if both parties agree to the continuation of the same.)

Any indenture may be annulled by the Industrial Commission of Wisconsin upon application of either party and good cause shown.

[1] To meet the peculiar requirements of certain trades special arrangements for schooling may be made through the Industrial Commission of Wisconsin.

At the completion of the apprenticeship the said minor shall receive a certificate stating the terms of his indenture.

IN WITNESS WHEREOF, The parties have caused this indenture to be signed as required by Chapter 133 of the laws of Wisconsin, 1915.

........................(seal)	....
(Apprentice)	(Name of firm or corp.)
....	By............................
(Parent or guardian) (seal)	

EXHIBIT A

Notice: No apprenticeship indenture will be legal which does not have this exhibit filled out as indicated below. (Ch. 133, Laws of Wisconsin, 1915.)

Extent of period of apprenticeship. (Here must be stated the length of time to be served, and, wherever the trade can determine, the exact length of each apprenticeship year.)........................
Schedule of processes to be worked. (Here must be stated the processes, methods or plans to be taught and the approximate time to be spent at each process, method or plan—to conform to the character of the individual trade.)................................
Compensation to be paid. The apprentice shall receive in wages:
....
Special provisions. (These to be stated here or on the following page.) ....

APPENDIX J

COLLECTIVE AGREEMENTS BETWEEN EMPLOYERS AND LABOR ORGANIZATIONS FOR THE REGULATION OF APPRENTICESHIP IN MASSACHUSETTS[1]

I. Scale and Agreement Between Boston Daily Newspapers and Typographical Union No. 13

In effect November 16, 1916

Apprentices

Section 21. Apprentices may be employed subject to the following regulations:

1. One apprentice to every fifteen (15) journeymen, or major fraction thereof regularly employed; the number of apprentices in any office not to exceed four (4), except that when an apprentice enters his fifth year the office may employ another apprentice, and except that the Joint Apprentice Committee shall have the power to arrange so that each office having the maximum number of apprentices shall have at all times at least one apprentice in each year of service.

2. Apprentices shall not be less than sixteen years of age at the beginning of their apprenticeship, and shall serve a term of five years. The term of five years may be extended by the Joint Apprentice Committee when in its judgment conditions warrant an extension. All apprentices must be enrolled by Boston Typographical Union No. 13 and the International Typographical Union.

3. During the first two years an apprentice may be required to perform general work in the composing room at the discretion of the foreman. During the third, fourth and fifth year an apprentice

[1] Labor Bulletin No. 121, State Bureau of Statistics, Boston, Mass.

must be given instruction and devote all his time to acquiring knowledge of all the intricate work of the trade.

4. During the third and fourth year apprentices must be employed in the ad-room at the general work of that department. During the first three months of the fifth year they must be employed on the make-up. During the second three months of the fifth year they must be employed in the proofroom at the general work of that department. During the last six months of the last year of apprenticeship the apprentice shall be permitted to learn the operation of type-setting and type-casting machines, and must be given opportunity to acquire knowledge of all classes of work on such machines.

5. When lumpers or office boys are needed in a composing room, those employed shall be classified as such. Lumpers or office boys shall not be eligible to an apprenticeship unless they have qualified before the Joint Apprentice Committee. Lumpers or office boys shall not be permitted to set or distribute type, make up or break up type matter or forms, lead or unlead matter, correct proofs, lock or unlock forms, operate machines, or distribute leads, slugs or rules; but lumpers or office boys may handle leads, slugs, or rules by taking them from casting machines, or any original source, and placing them in general sort racks, said racks to be located at the convenience of the office.

6. The minimum scale of wages to be paid apprentices for the years stated shall be:

Day Work

Third Year	$15.00 per week
Fourth Year	18.00 per week
Fifth Year	21.00 per week

Night Work

Third Year	16.00 per week
Fourth Year	19.00 per week
Fifth Year	22.00 per week

7. In no instance shall an apprentice be allowed to work overtime.

8. At the completion of the second year of their apprenticeship all apprentices, if competent, must be admitted as apprentice members of the union, and shall be protected against unfair discrimination

and discharge, the same as if they were journeymen. All contested discharge and discrimination cases covering apprentices beginning with the third year of their apprenticeship shall be settled under the terms provided in Section 19 of the agreement between the Boston Daily Papers and Typographical Union No. 13.

9. Beginning with the third year of apprenticeship the Secretary of Boston Typographical Union No. 13 shall grant the apprentice a card indorsed for each year's service.

Joint Apprentice Committee

A Joint Apprentice Committee, composed of two representatives of the Boston Daily Newspapers and two members of Boston Typographical Union No. 13 shall be formed.

This committee shall see to it that all apprentices before being enrolled, possess a grammar school education or its equivalent and are able to read manuscript intelligently.

The committee shall devise ways and means for the further education of the apprentice by continuation study.

The committee shall require that apprentices, beginning with the last eighteen (18) months of their apprenticeship, complete the International Typographical Union Course of Instruction in Printing. Beginning with the first week of the third year every apprentice shall pay to the secretary of the union the sum of fifty (50) cents a week for a period of fifty (50) weeks for the purpose of paying for the International Typographical Union Course in Printing.

Apprentices working days shall spend at least one evening a week, and apprentices working nights at least one afternoon a week in academic and mechanical instruction, at a school to be agreed upon by the Joint Apprentice Committee.

The committee may require the apprentice to take a reasonable amount of home study so as to prepare himself for examination at the end of each period of his apprenticeship.

Apprentices shall be required to appear before the Joint Committee at the end of each period in order to qualify for increased wages and further advancement, as provided in the agreement.

It shall be the duty of the employer to see that proper instruction, in accordance with the recommendation of the Joint Apprentice Committee, is given to all apprentices whom he may employ.

It shall also be the duty of the foreman and journeymen to teach

apprentices the printing business, and the duty of the Joint Apprentice Committee to see that this is done. An apprentice may appeal to the Joint Apprentice Committee if he deems an injustice is done him.

The committee shall have full power and authority any time during the term of apprenticeship to cancel the apprenticeship of an apprentice who does not show aptitude and proper qualifications for the work. Apprentices cannot leave the office of one employer and accept work in the office of another employer without the written consent of the Joint Apprentice Committee.

Interpretation

Section 22. Any question regarding the interpretation of any section under this scale shall be referred for settlement to a joint committee of publishers and union, it being the intent of this section that each section of the scale shall be interpreted alike in all offices.

II. Agreement Between Electrical Contractors and Local No. 96, International Brotherhood of Electrical Workers, of Worcester and Vicinity, May 1, 1916 to May 1, 1919

Article V

Section 1. The party of the second part shall be composed of journeymen, helpers, and apprentices.

A journeyman, one who has worked at the trade four years and has passed a journeyman's examination and been admitted to the union.

A helper, one who has worked at the trade two years and has passed a helper's examination and has been admitted to the union.

Apprentices shall be divided into two (2) classes, first- and second-year apprentices:

A first-year apprentice, one who is registered with the union, paying the regular registration fee, and to be employed in the shop or as a locker boy on job.

A second-year apprentice, one who has served one year at the trade in the shop and who has passed an apprentice's examination and been admitted to the union.

Section 2. The party of the first part agrees to employ not more than one helper to each journeyman on any job, and not more than one second-year apprentice on any job, except when four or more journeymen are employed on said job, then two second-year apprentices may be employed.

Section 3. Each shop may employ one apprentice to every three journeymen in their employ, and no helpers or apprentices shall be allowed on any job without a journeyman; except, when the journeyman is temporarily called away, then said helper or apprentice may remain the balance of the current day.

III. Agreement Between Local No. 257, Brotherhood of Painters, Decorators, and Paperhangers of America, of Springfield, and Employers

In effect May 1, 1916

Article III—Apprentices

Section 1. Any person engaging to learn the trade of painter, paperhanger or decorator, must be a male over the age of sixteen years and under the age of twenty-one years at the time he registers as such apprentice, unless special dispensation is granted by said local union. He shall be required to serve a regular apprenticeship of at least three consecutive years.

Section 2. Any employer taking an apprentice shall agree to employ him in learning such trades for twelve months in each year. Such employer shall be entitled to thirty days' trial upon employing such apprentice at the expiration of which period if such apprentice shall have proved himself satisfactory to such employer, he shall be properly indentured by said local union. If such apprentice shall not have proved satisfactory to said employer, he shall not be required to keep him, but will be required to pay him at the rate of six dollars per week for the time which he has worked. No such apprentice shall be allowed a trial with more than two contractors, and no contractor shall be allowed to try more than two such apprentices consecutively.

Section 3. Wages of apprentices from the date of registration shall be as follows:

$6 per week for the first year.

$9 per week for the first six months of the second year.

$11 per week for the second six months of the second year.

$15 per week for the first six months of the third year.

$18 per week for the second six months of the third year.

After the first year the apprentice shall appear before an examining board which shall consist of an equal number of members of said local union and employers, one of which shall be said apprentice's employer, and shall be examined as to his ability to perform the work for which he is apprenticed for the time served. Such examinations shall be held every six months. An apprentice failing to pass a satisfactory examination shall be compelled to serve for the following six months at the same rate of wages.

Section 4. Apprentices shall not be allowed to work more than nine hours per day when working in the shop and no apprentices shall be allowed to work on any job away from the shop more than eight hours on any Monday, Tuesday, Wednesday, Thursday, or Friday, or four hours on any Saturday. Apprentices registered in any shop shall be allowed to work in that shop and in none other, except by mutual agreement of such apprentice's employer and proposed employer and the Local Union. No apprentice shall be permitted to work on Sundays except for double pay, or on any job unless his employer shall at the same time be employing at least two journeymen on that job or on other jobs.

APPENDIX K

CLASSIFICATION OF INDUSTRIAL SCHOOLS AND TRAINING METHODS

In the classification which follows, no detailed definitions have been attempted, because practices in different schools and in different parts of the country differ too widely to allow fine distinctions to be made. Particulars regarding the examples cited can be secured from the literature listed in the bibliography or from the courses of study issued by the schools mentioned. Bulletin No. 17 of the Federal Board for Vocational Education gives a detailed statement of the kinds of classes which may receive support from federal funds.

I. Public Schools

1. Manual training and technical high schools (see Chapter VI).
2. Trade Schools.

   Institutions designed for the purpose of teaching the practice and theory of one or more trades. The instruction given each student is confined to the trade which he elects to follow.

   (a) All-day unit trade schools or classes are for persons over 14 years of age who wish to prepare themselves for some specific trade. All of the related academic work as well as the shop experience is based upon the work which the student elects to undertake. Examples: Manhattan Girls' Trade School, New York City; Trade School for Boys, Boston, Massachusetts; Lowell Textile School, Lowell, Massachusetts; The Public School of Trades for Boys, Milwaukee, Wisconsin; State Trade School, Bridgeport, Connecticut.

   (b) Part-time schools and classes may be either trade extension or trade preparatory.

   (1) In the first case the employee is given instruc-

tion to supplement the experience gained in the shop, the purpose being to acquire skill or knowledge immediately applicable to the work in which he is engaged.

(2) Trade preparatory schools or classes give instruction designed to prepare an employee for promotion or for entrance upon an entirely different line of work.

In either case, the classes are held during the regular working hours. They may be supported entirely at public expense, or as a co-operative undertaking with the employers concerned. Examples: Beverly Industrial School, Beverly, Massachusetts; Co-operative High School, Dayton, Ohio; Rochester Shop School, Rochester, New York.

(c) Evening trade schools are intended either to perfect the person already in a trade or to prepare for promotion or a change of occupation. Federal aid is given only for work of the first type. Examples: Independent evening industrial schools established by the State Board of Education in many cities in Massachusetts; New York Evening High School for Women, New York City; Evening courses of the McKinley Manual Training School, Washington, D. C.

3. Day and evening Continuation Schools

Several states require employed minors under specified ages to attend school several hours each week. The classes may be held either in a building supplied by the school or at the place of employment. Both academic and practical instruction are offered, although the former usually predominates because of the small amount of time available.

4. Prevocational Schools

A type of school originally intended to assist retarded children to choose their occupations and prepare for more specific trade training or entrance to manual training, commercial, or mechanic arts high schools. The tendency has been toward making them trade schools for backward children. They are now being largely superseded by junior or intermediate high schools. For examples, see "Prevoca-

tional Education in the Public Schools," by Leavitt and Brown.

5. Intermediate Industrial Schools

These schools differ from the prevocational school in not keeping open the road to later high school entrance. They offer courses combining shop and academic work from one to four years in length for boys and girls who wish to enter at once upon industrial life but who are either not old enough to enroll in technical or trade schools or wish more academic work than the trade school offers. There is little demand for them save "where traditional education is most strongly entrenched and blindly unyielding to the needs of the majority of school children."[1] The development of junior high schools and more practical high school courses has practically stopped their further establishment. Examples: Rochester Shop School, Rochester, New York; Newton Independent Industrial School, Newton, Massachusetts.

6. General Industrial Schools

As established under the Federal Board for Vocational Education, these schools or classes are intended to fit persons for employment in the trades, who live in towns of less than 25,000 population where the number in any one trade group is not large enough to warrant a unit course. Students from a closely related group of trades are given instruction intended to assist all of them. Thus a building trades group may attend classes in mathematics, estimating, elementary structural and architectural drawing, building ordinances, and may do school shop work in concrete construction, bricklaying, carpentry, and plumbing.

7. Higher Technical Institutions

Chemists, mechanical engineers, draftsmen, electrical engineers, and other technical experts are trained in the departments of science, engineering, and applied design in various state universities. To a more limited extent, the general college courses supply men who become executives or staff experts after a brief period of apprenticeship.

8. Schools of Commerce and Business Administration

State universities, as for example in California, Iowa,

[1] Leavitt, Frank M., "Examples of Industrial Education," page 129.

Wisconsin, and Kansas, offer special courses in the planning, accounting, and executive phases of industrial administration.

9. Americanization

Classes for teaching citizenship, American ideals, and English to persons of foreign birth or foreign parentage are usually organized in connection with public evening schools. Although the general educational value of this work predominates in the aims of the majority of the educators who direct it, industry nevertheless enjoys a direct benefit from it because of the increased efficiency of English-speaking employees.

10. Correspondence Schools

Correspondence courses meet the need of the large number of ambitious persons engaged in industrial pursuits who cannot enjoy the privileges of other types of education. Several state universities and a few state boards of education offer courses which provide theoretical instruction to supplement the experience gained in the shop or factory.

In addition to technical trade courses, correspondence instruction is now available in factory management, office methods, accounting, safety, plant sanitation, and labor problems. Traveling instructors who meet groups of students for occasional conferences and lectures have added greatly to the efficiency of this method.

II. Private, Philanthropic, and Endowed Schools

Nearly all of the types of public schools mentioned above are paralleled by similar schools of a private or philanthropic nature.

1. Manual training and technical high schools

Examples: Wilmerding School of Industrial Arts, San Francisco, California; Tuskegee Normal and Industrial Institute, Tuskegee, Alabama.

2. Trade Schools

Examples: Williamson Free School of Mechanical Trades, Delaware County, Pennsylvania; David Rankin, Jr., School of Mechanical Trades, St. Louis, Missouri; Girls' Trade School, Boston, Massachusetts.

3. Higher Technical Institutions
   (a) Between high school and college: Wentworth Institute, Boston, Massachusetts; Carnegie School of Applied Industries, Pittsburgh, Pennsylvania; Drexel Institute, Philadelphia, Pennsylvania.
   (b) Of college or university rank: Massachusetts Institute of Technology, Cambridge, Massachusetts; Armour Institute of Technology, Chicago, Illinois; Carnegie Institute of Technology, Pittsburgh, Pennsylvania.
4. Schools of Commerce and Business Administration
   Examples: Girard College, Philadelphia, Pennsylvania; New York University; Y. M. C. A. Commercial Schools; Graduate School of Business Administration of Harvard University.
5. Correspondence Schools
   International Correspondence Schools, Scranton, Pennsylvania; American School of Correspondence, Chicago, Illinois.

III. Trade Union Schools

The chief aim of these schools has been to provide supplementary technical education and a broader experience for trade apprentices. Three types of organizations have appeared:

1. Correspondence Courses

   The International Typographical Union gives a typical correspondence course in the principles of printing. The work is carried on under the auspices of the Inland Printer Technical School of Chicago.
2. Co-operative Trade Schools

   A trade school may be established and maintained by the membership of the union as a co-operative enterprise. Thus a school was established in September, 1909, by the wood-workers' branch of the Carriage, Wagon, and Automobile Workers' Union of New York. Sessions are held on Sunday mornings and in the evenings during the week, the course comprising three years of 26 weeks each year. Tuition fees are charged to cover expenses.
3. Trade Schools under Joint Arbitration Boards or Under Co-operative Agreements
   (a) In 1907, by agreement between the school authori-

ties and the arbitration board of the employing carpenters and the carpenters' unions of Chicago, classes for apprentices were opened in two public schools, the Central Young Men's Christian Association, The Lewis Institute, the Pullman Evening School, and the Chicago Technical College. Contractors taking apprentices agreed to employ them for nine consecutive months each year and see that they attended school during the remaining three months, January, February, and March.

(b) The school of the United Typothetae on the Arsenal Technical Grounds in Indianapolis is administered jointly by the United Typothetae and the Franklin clubs of America, with the approval and co-operation of the local authorities and the International Typographical Union.

IV. Methods of Training Used by the Industries

The term "corporation school" has occasionally been applied to all of the formal means of instruction listed below. The aims of the National Association of Corporation Schools as set forth in its constitution are: "first, to develop the individual employee to his highest efficiency; second, to increase the efficiency of industry; and third, to influence courses in established educational institutions more favorably toward industry."

Following the terminology used by this association, a corporation school may be defined as "any school maintained by a business concern, quite independent of outside control, for the purpose of fitting its new employees for efficient service, or for the further training of its older employees to fit them for positions of greater responsibility, as foremen, executives, or technical experts." [2]

Schools for advertising, selling, distribution, and retail salesmanship, so far as they are connected with the industries, are included in this outline under "Special Classes" or "General Corporation Schools."

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[2] Beatty, Albert James, "Corporation Schools," page 43.

1. Instruction by Skilled Employees

   The new employee is placed under the special care of a skilled worker who gives him only incidental or occasional attention.

2. Instruction by Foremen

   The foremen are held responsible for initiating all recruits. Where the operations are relatively simple, the labor turnover small, and the foreman has only a few persons under his charge, this is still an economical plan.

3. Shop Instructors

   Special instructors are placed in each department who give part or all of their time to training new employees. Certain benches or machines may be set aside for the use of learners. In some cases, inspection and instruction are combined, each inspector having charge of a small number of employees whom he assists and instructs.

4. Threshold or Vestibule School (Full-time)

   Before the new employee enters the factory proper he receives a preliminary course of intensive training in a separate room or section, working on standard machines and producing commercial products, but under the guidance of special instructors. (See Chapter X.) The training may be supplemented by instruction in blue-print reading, shop discipline, safety, company policies, and general information on materials, machinery, and methods.

5. Threshold or Vestibule School (Part-time)

   Instruction is given in a separate training department following the general procedure outlined above, but on a part-time basis and intended to give assistance to semi-skilled employees in the work they are doing, or to prepare them for a higher grade of work.

6. Apprenticeship

   (a) The apprentice agrees to work for a period of three to seven years at reduced wages. In return he is allowed to spend some time in all of the several divisions and grades of work represented by his trade. There is no formal instruction in methods or principles, the success of the plan being dependent entirely upon the initiative of the apprentice and the willingness of foremen and workmen to assist him.

(b) The arrangement is similar to that outlined above except that the agreement includes opportunity for technical education outside of the plant. R. Hoe and Company of New York have their own school which is attended by apprentices three nights each week for nine months each year. By attending the North End Union Printing School for one year, printing apprentices in Boston may reduce their term of service from five years to four years, at the same time increasing their rate of pay sufficiently to more than make up for the year spent without wages.

7. Apprentice Schools

The usual diversified shop experience of the apprentice is supplemented by classroom and laboratory study of related academic and technical subjects, the instruction being given during the day on the company's time. A part of the shopwork may be given in a separate room or division similar to that used in the vestibule school. The period of apprenticeship may be shortened to accommodate the needs of students with college or technical school training. (See Chapter IX.)

8. The "Flying Squadron" Plan

This is essentially an intensified, shortened apprenticeship. Groups of students are allowed to work for brief periods in each of a number of manufacturing or office departments. This experience is usually supplemented by lectures and other classroom exercises. (See page 198.) The term "special training school" has been applied to a variation of this method adapted especially to training college graduates or other technical men. Plans vary from the course requiring all of the student's time in study, investigation, or inspection trips, to the course where the student's time is almost wholly productive, little or no time being allotted by the company for class or individual instruction in related subjects.

9. General Corporation Schools

Courses of study are offered for employees in the financial, administrative, and production departments. No formal apprentice agreement is required, although a bonus

or some other incentive may be offered for successful completion of the work. The majority of the courses are of the short-unit type, intended to prepare for or improve the employee in a limited field. Longer courses, including a considerable amount of related academic and technical studies, may be outlined for those desiring to prepare for more responsible positions. The proportion of productive work in comparison with the time given to classroom exercises varies according to the aim of the course and the previous training of the students.

This plan may be combined with or include any of the eight methods outlined above, or relations may be maintained with public or private schools in giving co-operative or continuation education. (See page 171.)

10. Special Classes

In many firms there is no functionalized educational organization. Training is accomplished by foremen or department heads. Office and executive positions are filled from trained persons drawn from outside sources. Under these conditions, the need may occasionally arise for giving special training to small groups. Classes for clerical employees, evening lectures on technical subjects, or lectures and discussions for foremen may be organized on this basis.

11. Americanization

The aims differ from those held by the public school in that the private corporation is interested primarily in helping the foreigner or illiterate to gain a command of spoken and written English so that he may become a more efficient workman. Training for citizenship is usually incidental or wholly neglected, the emphasis being placed upon the use of shop terms and simple English. Instruction is offered in both day and evening classes, either with or without remuneration to the employee for the time spent.

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